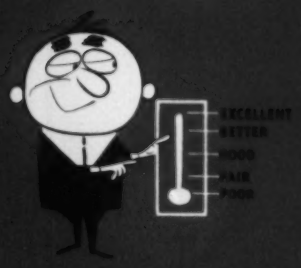
APRIL 4, 1960

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

The Editors Present . . .

NEW BUSINESS PLANNING TOOL



STEEL's panel of 45 of the nation's top economists sees a moderate business pickup well into 1961. This is the first in a series of semiannual forecast surveys. For the economists' views on eight widely used business indicators, see Page 91.

Most of the Freight Cars You'll Need Will Be Available

Space Program Offers New Markets

How United Air Lines Pampers Its Jet Engines During Overhauls

Thinner, Flatter Sheets Widen Market Potential for Titanium

Component Buyers Put on the Brakes

PRODUCTION EFFICIENCY

How to Achieve It With Limited Capital

No. 7 in STEEL's Program for Management

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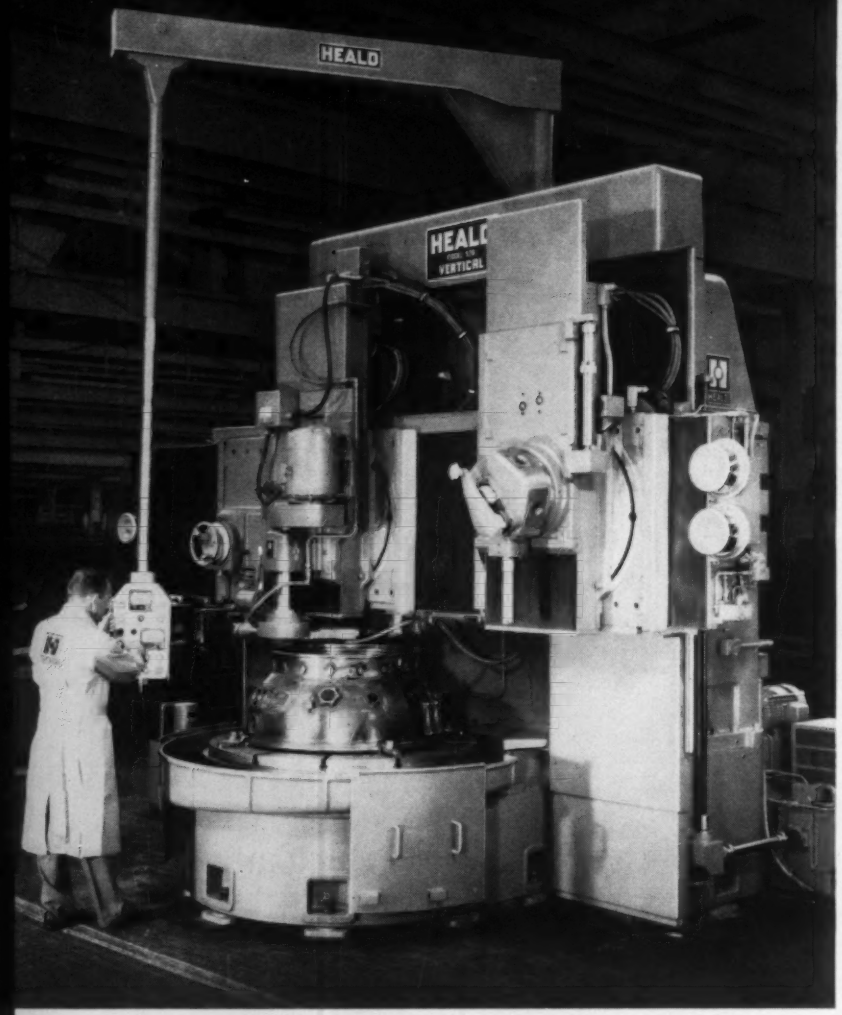
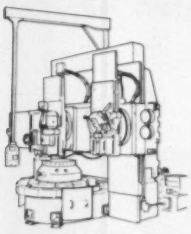
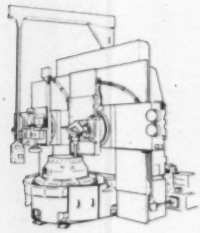


new

from HEALD



IT PRECISION GRINDS
I.D.s, O.D.s, Tapers and Faces



IT BORES, turns, faces
grooves and chamfers

MODEL 578 VERTICAL GRINDING MACHINE

speeds rebuilding of jet engines at United Air Lines

REFINISHING big jet engine parts calls for high precision internal and external grinding, as well as a variety of rough and finish boring, turning and facing operations. United Air Lines is meeting both of these requirements to excellent advantage with the completely new Heald Model 578 Vertical Grinding Machine shown above.

With two separate and independently controlled vertical slides — one for grinding and the other for Borizing — this massive unit is really two machines in one. Either vertical slide can be positioned over the work by indexing on a common cross rail. Both vertical slides have 20 inches of travel and can be swiveled 45° to either side of the vertical position for doing angular surfaces. The grinding head can be used for I.D., O.D. or rotary surface grinding and the turret-type Borizing head accommodates up to five boring bars. The work table will take parts up to 48″ high and 52″ in diameter and can be operated at speeds from 2½ to 180 rpm.

All operating controls are centralized on a pendant control box which can be raised or lowered 24″ and swung to any area around the machine for operation from any position.

If your operations call for combined grinding and Borizing of large work, be sure to look into this radically new Heald machine. Your Heald engineer will be glad to give you complete information.

It PAYS to come to Heald

HEALD®

THE HEALD MACHINE COMPANY

MMT-PE — MODERN MACHINE TOOLS — PRODUCTION EFFICIENCY

Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • Milwaukee • Lansing • New York • Philadelphia • Syracuse

This Week in STEEL

The Metalworking Weekly

April 4, 1960 Vol. 146 No. 14

Most Freight Cars You'll Need Will Be Available

Contrary to earlier fears, no general shortage is anticipated this year. A more favorable equipment situation is partly the result of below forecast business levels. The number of serviceable cars is greater than last year, new car deliveries are rising, turnaround time is being reduced. Nevertheless, some special types—hoppers, long gondola, and double-door boxes—may run short. PAGE 96

Space Program Offers New Markets

Wide-awake metalworkers are taking advantage of the host of opportunities offered in space technology by the National Aeronautics & Space Administration. Up to 80 per cent of the agency's work is contracted to private industry and administered by widespread field offices. Supplying goods, equipment, and services to the agency is a big and growing market for industry. PAGE 94

How United Air Lines Pampers Its Jet Engines

Specialized machines and intricate material handling networks give United Air Lines's new, multimillion dollar engine overhaul facility the look of a Detroit auto plant. The facility, designed for overhaul and rebuilding of United's turbine jet engines, is loaded with advanced metalworking production and inspection equipment. At peak operation, the plant will be able to handle five engines a day. Jets like this are overhauled after every 800 hours in the air. PAGE 136

Flatter Titanium Sheets Widen Market Potential

Buyers of titanium sheets can now take greater advantage of the metal's strength-to-weight ratio, with thinner and flatter material from Republic Steel Corp.'s Central Alloy District, Canton, Ohio. The heat treated alloy sheets should solve problems in aircraft and missile fabrication as well as in other applications. PAGE 138

Component Buyers Put on the Brakes

Rising inventory costs and below-forecast business performance are signaling the end of inventory building by component customers. STEEL's quarterly analysis of the buying outlook is on PAGE 177

How to Get Production Efficiency on Limited Capital

Can't afford that new equipment you know you need? STEEL's continuing series on effective, competitive production points out the alternatives you can use—and analyzes their usefulness. PAGE 101

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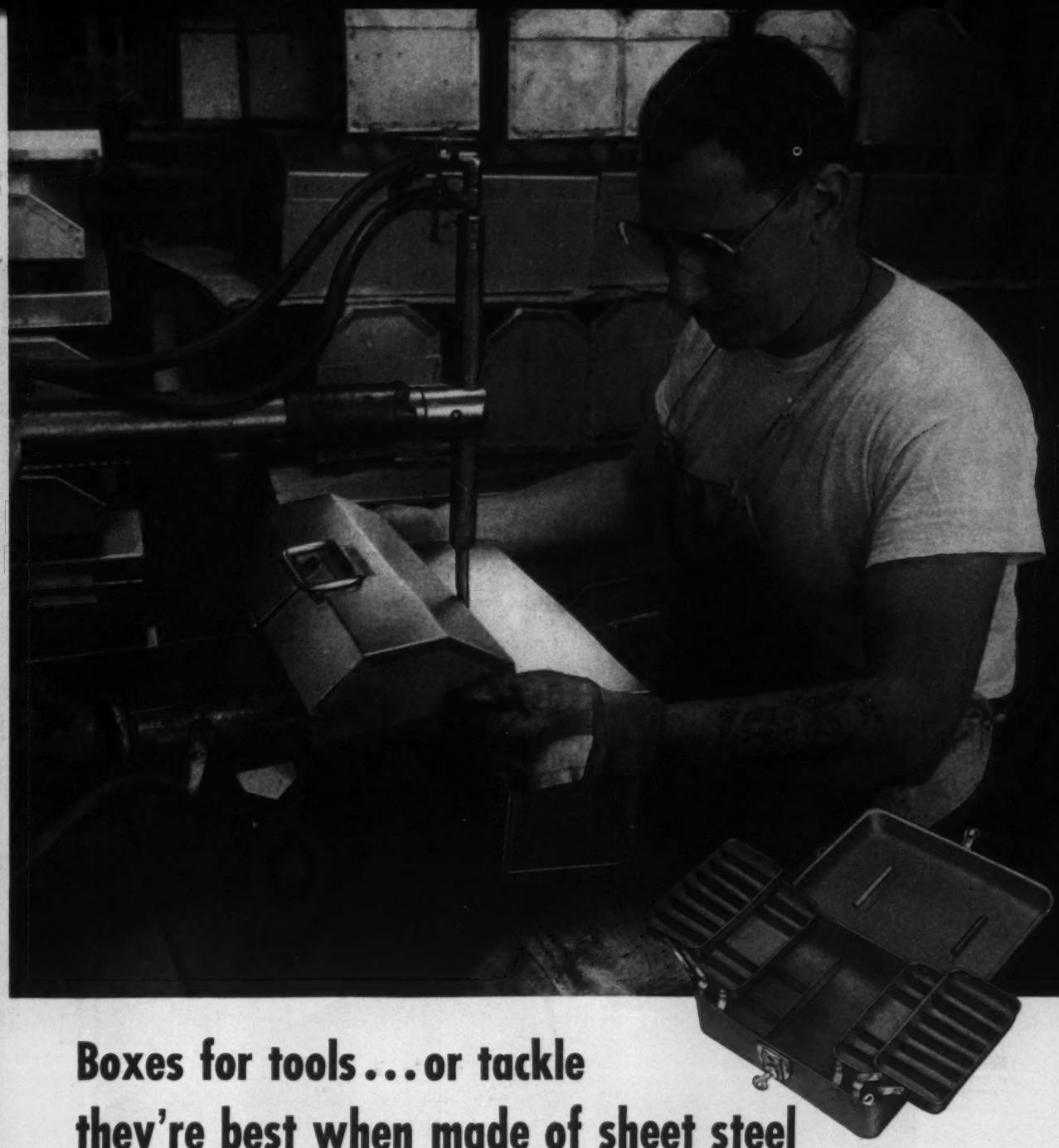

Boxes for tools...or tackle they're best when made of sheet steel

Strong, durable, easy to work, light in weight, low in cost—all these factors point to sheet steel as the ideal material for tackle and tool boxes. Whether you make or use such boxes, you can be sure they're best if they're made of sheet steel.

Bethlehem sheets—cold-rolled as well as Bethcon continuously galvanized—are used in the manufacture of thousands and thousands of utility boxes. Other Bethlehem sheets go into automobile stampings, agricultural machinery, grain storage bins, metal furniture, tubing and, yes, baby carriages! We'll be glad to discuss your requirements.

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Export Distributor: Bethlehem Steel Export Corporation

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BETHLEHEM STEEL

BETHLEHEM STEEL

IF EVER A BOLT CAME UP WITH THE ANSWERS— IT'S THIS ONE!

The Lamson High Strength Bearing Bolt is solving some of the oldest, meanest and costliest problems ever presented by steel connections.

Recent highly successful applications include: steel mill buildings and cranes, railroad bridges, dragline buckets, construction machinery, radar antennas.

THE BASIC ADVANTAGES ARE BIG ONES:

1. High Strength Bearing Bolts combine the tensile strength of High Strength Bolts with the bearing properties of rivets.
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3. High Strength Bearing Bolts make possible important labor savings in fabrication and erection.
4. The High Strength Bearing Bolt assembly (bolt, nut, one washer) costs no more, grip for grip, than a High Strength Bolt assembly (bolt, nut, two washers).
5. High Strength Bearing Bolts (and Lamson High Strength Bolts) are available from every Steel Service Center of U.S.S. Supply Division, United States Steel Corporation.
6. High Strength Bearing Bolts are produced by Lamson & Sessions, a "major" in the fastener industry and a prime producer of structural fasteners since the turn of the century.

FOR PRICE AND DELIVERY INFORMATION: Contact any Steel Service Center of United States Steel Supply.

FOR ENGINEERING BULLETIN AND SAMPLE: Write The Lamson & Sessions Company, 5000 Tiedeman Road, Cleveland 9, Ohio.

For easy driving, the knurls are ball-shaped in front, relieved in back, set in a spiral pattern. In most grips, bolt can be placed in hole, then pulled through connection with torques well below final assembly torque. One man can install—no need to hold the head.

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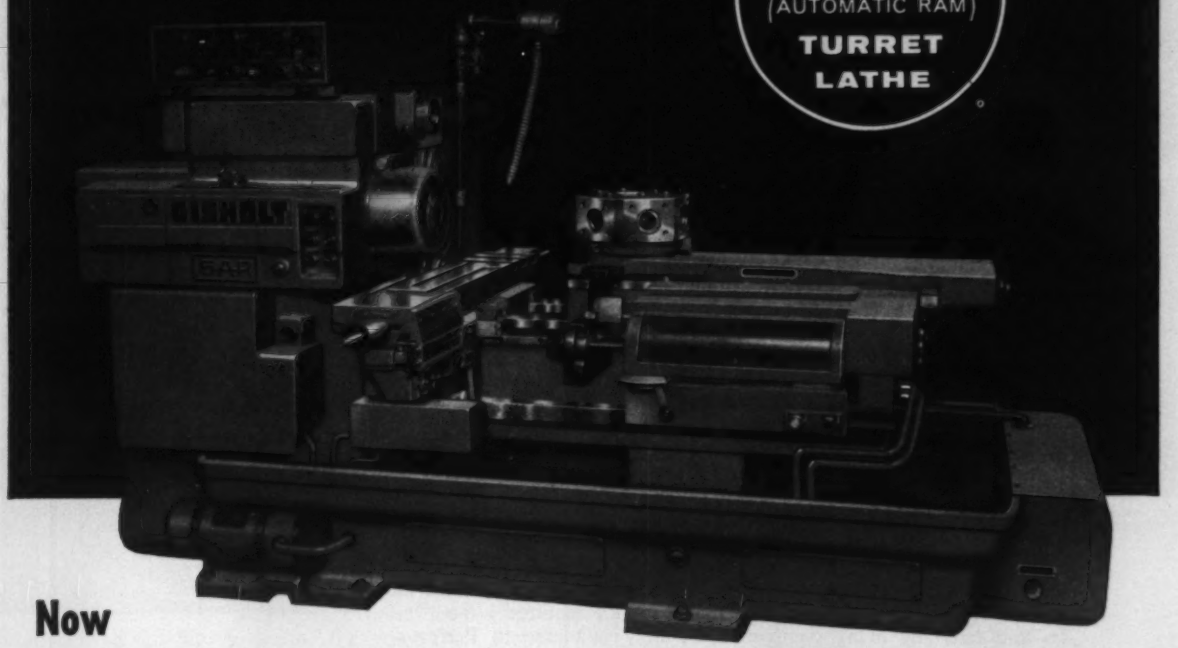
Plants in Cleveland and Kent, Ohio • Chicago and Birmingham

ANNOUNCING

the new GISHOLT AR (AUTOMATIC RAM) TURRET LATHE



Now one machine does both bar and chucking work... automatically

Here is a ram-type turret lathe "gone automatic." It's the new Gisholt MASTERLINE AR. It handles both bar and chucking work. Changeover takes less than 1 hour. But that's not all. It combines the efficiency and consistent production of an automatic with fast setup and versatility. Yet, the new AR costs very little more than a hand-operated turret lathe!

For long runs or small lots. Whether you are now using automatics for long runs, or standard ram-type turret lathes for small lots, you'll want to evaluate this new development in automatics. You will quickly see how the new AR will cut your costs. Based on productivity, capacity, versatility, dependability, ease of operation, setup speed and original cost, you'll find it's a new best buy for your equipment dollar today!

Ask for desk-side demonstration. Your Gisholt Representative will gladly explain the cost-cutting features of the new AR and show you how it can boost profits for you. Ask for your personal, desk-side demonstration or write for literature.

Investigate Gisholt's Extended Payment and Leasing Plans

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Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • *Factory-Rebuilt Machines with New-Machine Guarantee*

PERFECTO-PEEN

HOW HIGH-VELOCITY* PEENING, CLEANING, FINISHING CUTS COSTS!

(*to 150 psi)

Perfecto-Peen's high-velocity (up to 150 psi) peening process cuts your costs because in one process you can stress relieve, work harden, clean and finish metals and metal products *faster* and *better*.

For example, the above casting required cleaning. Perfecto-Peening did that fast (see chart below.) In the same process, too, Perfecto-Peening cleaned and stress relieved threaded sections; it stress relieved machine surfaces; and produced a fine, uniform matte-satin finish.

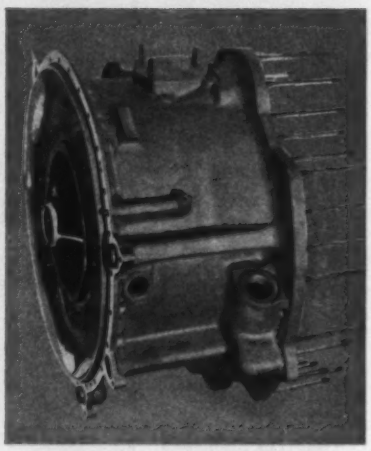
Perfecto-Peening did this without any limiting factors. No masking is required. Dimensional stability is maintained (true even for precision parts). There is no surface residue, no contamination.

Compare these advantages with the limitations of other methods — manual, mechanical, blast or chemical — and you will realize, as many users already have, why high-velocity Perfecto-Peening is the ideal cost-saving method.

Perfecto-Peening uses various sizes of glass beads made from optical crown glass to provide impact resilience, purity and elasticity. Beads are suspended in a special slurry solution and blasted onto surfaces through a nozzle at high velocities up to 150 psi. (You can also use all types of wet blast material with no conversion kit required.)

To find out why many companies are now switching to Perfecto-Peening, write for our bulletin PPD-123. Better yet, send us a sample with your peening requirements and we will peen it without charge.

The Model A-50 machine is welded stainless steel construction. Operates on 110-v 60-cycle a-c and requires air pressure of 90 psi/50 cfm. Uses no pump but has sump to contain process slurry solution. Original set up time only 10 to 15 minutes, from empty machine to start of production. Custom machines designed and built for any production requirements.



LABORATORY TESTS IN CLEANING METAL PARTS UNDER FOLLOWING CONDITIONS

SURFACE CONDITION	AREA	CLEANING TIME
Corrosion, rust or equivalent	48 sq. in.	30-60 seconds
Carbon or equivalent	48 sq. in.	60-80 seconds
Deep oxide or equivalent	48 sq. in.	3 minutes

PERFECTO-PEEN

Division of: Aero-Test Equipment Company, Inc.

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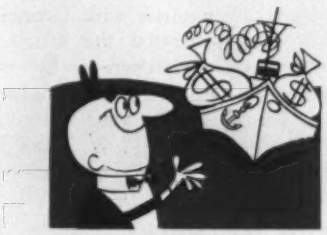
Please direct all correspondence to attention of Ed Service, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

April 4, 1960

Some Sage Has Said . . .



. . . You can't expect your ship to come in unless you've sent one out. Each issue of the good ship STEEL carries printed cargoes that can be converted into the coin of the realm. If you want your ship to dock with $1000 aboard, just enter our Usership Idea contest. Here's how to . . .

Get Underway

Tell us, in 300 words or less, how you plan to use an article or advertisement in this issue (or any other issue published this month—April, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

There's more . . . you will win an additional $500 if you furnish written proof that you were successful in accomplishing your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

Entries will be judged by a committee of STEEL editors. All letters become the property of STEEL Magazine. Please identify your letters as Usership entries.

You can enter as many times as you wish. **Deadline for the April contest is June 1, 1960.** Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

Now Hear This

Some hardworking STEEL reader has a ship about to heave in sight. The judges are winding up final conferences on entries in our February contest. We will announce their findings later this month.

Neither Shivers nor Slivers

For awhile, we cogitated making this next letter a Usership contest entry. We quote A. W. Lancaster who writes from the cold regions of Orillia, Ont.: "Vinyl-metal laminates featured in STEEL's article: 'Vinyl-Metal Potential: 1 Billion sq ft,' Feb. 22, pp. 103-106, have been in the back of my mind since I read about Japanese people bathing and relaxing in warm, wooden bathtubs. I dug up STEEL's article of Mar. 9, 1959 ('Warmth of Color and Feel Added to Strength of Steel') before reading the Feb. 22 issue, to see if vinyl coatings had ever been applied to bathtubs. Someone is missing a bet. The usual bathtub is generally not too warm to feel."

New Control Captivates Readers

Since announcing a new fluid control system that has no moving parts, the U. S. Army's Diamond Ordnance Fuze Laboratory and STEEL have been swamped with inquiries from industry. ("Army Unveils New Fluid Control," STEEL, Mar. 14, p. 49.) The lab plans to issue an engineering handbook, but issuance is being delayed until the three scientists who developed the control complete a series of presentations to industry. The next meeting takes place at the lab Apr. 8, followed by one Apr. 22. If you wish to attend, write or phone John Wheeler, public relations manager, Diamond Ordnance Fuze Laboratory, Connecticut Avenue at Van Ness Street N. W., Washington 25, D. C.

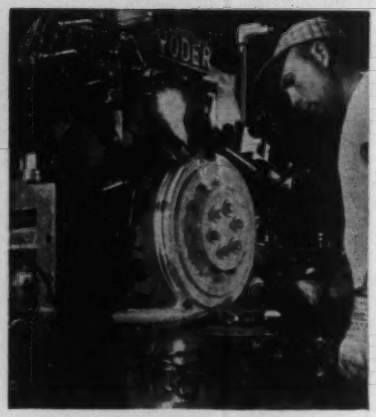
The Threat of Imbalance . . .

. . . in steel inventories and how you can strike a sound inventory level, are the major themes in an article due next week from Pittsburgh Resident Editor Bill Wallace. There is no reason to overdo inventory accumulation now that the eased labor situation assures product availability. Though most buyers are showing restraint, will they continue to do so? The question is important because recent recessions have been blamed, in part, on excessive inventory building.

Bill turned to producers, suppliers, and buyers to find out what guideposts will help metalworkers prevent overstocking. He also picked up some handy tips on buying policies. If you read the article, you might find answers to a question that haunts industrialists: "How much is enough?"

As the Sultan's Son Said . . .

. . . when he inherited his father's harem: "I see the opportunities, but I don't know where to be-



Yoder Tube Mills speed tailpipe production at AP Parts Corporation

The AP Parts Corporation (Toledo, Ohio), world's largest producer of replacement mufflers and tailpipes, uses 2 YODER Tube Mills to produce more than *300* ft. of 1¾", 1⅞" and 2" tubing per minute.

According to Mr. John Grindle, Plant Engineer, the two-man operated YODER Mills are vital to the production of the entire plant. "YODER Tube Mills earn their keep daily. They are easy to set up, maintain and operate ... the welds are clean and uniform. We depend on them for constant quality, high production and minimum downtime".

The YODER Tube Mills at AP Parts exemplify the production economies and dependability of all YODER-built equipment, whether it be Pipe and Tube Mills, Cold Roll-Forming Machinery or Slitting Equipment.

If your products require ferrous or non-ferrous pipe or tubing, from ¼" to 26" diameters, there is a YODER Mill designed to produce it economically, accurately and efficiently.

For complete information on YODER Pipe or Tube Mills ... write for the fully illustrated, 88 page YODER Tube Mill Book ... it is yours for the asking.

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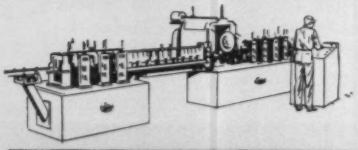

ENGINEERING YODER MANUFACTURING
PIPE AND TUBE MILLS
(ferrous or non-ferrous)

gin." So go inquiries about "Get Set for the Shock of Thermoelectricity," STEEL, Feb. 29, pp. 57-60. Our reprint mailing is running into the thousands of copies, and the flood shows no sign of abating.

Many readers ask for names of manufacturers, material developers, and research agencies. We talked about the inquiries with George Howick, the editor who generated the article. He has obligingly agreed to prepare a list of general references for anyone who is interested in thermoelectricity. Please address your letters to STEEL, Editorial Service Dept., 1213 W. Third St., Cleveland 13, Ohio.

Going to the Show?

The American Welding Society's annual meeting and welding exhibition, that is. It's scheduled for Los Angeles, Apr. 25-29. If you are, be sure to preview the show's program—it will be in STEEL next week. The editors are putting the finishing touches on a survey of equipment manufacturers and users which will tell you what's new in welding gear for 1960. They've also prepared technologic and economic status reports on the welding industry.

Also Coming Up . . .

. . . in the near future, is an article about a welding machine that the owner and developer is using to join extremely thin materials at high speeds with arcs of 10,000° F and up. Machine Tool Editor Bob Huber says the machine zips along like a high speed sewing machine—and welds made with it stand up under some mighty severe tests.

Profitless Pricing

"In preparing the annual report for our company, I lifted some material from your Feb. 29, editorial, 'Profitless Pricing,'" writes James M. Straub, president, Fort Pitt Bridge Works, Pittsburgh. "I consider it applicable to the structural steel fabricating industry and hope you do not object. I would also like to send copies of the editorial to the 325 members of the American Institute of Steel Construction."

A. W. Lisius, controller, Vapor Blast Mfg. Co., Milwaukee, says: "I consider the editorial priceless. If more people in metalworking were cognizant of the principles stated, the number of casualties resulting from profitless pricing (and making it up on the next order) would be reduced . . . Please send us 50 copies."

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Thump it—rap it—scrape it! High strength stainless steel stays unscathed . . . stays unrivaled for body and fender protection. It's the *one* metal that completely meets the demands of today's quality-conscious, value-minded market.

And today, more and more fabricators of stainless trim and functional parts specify Uniloy for improved formability and product quality. Call Universal-Cyclops for Uniloy Stainless Steel in the exact grade and finish you need.

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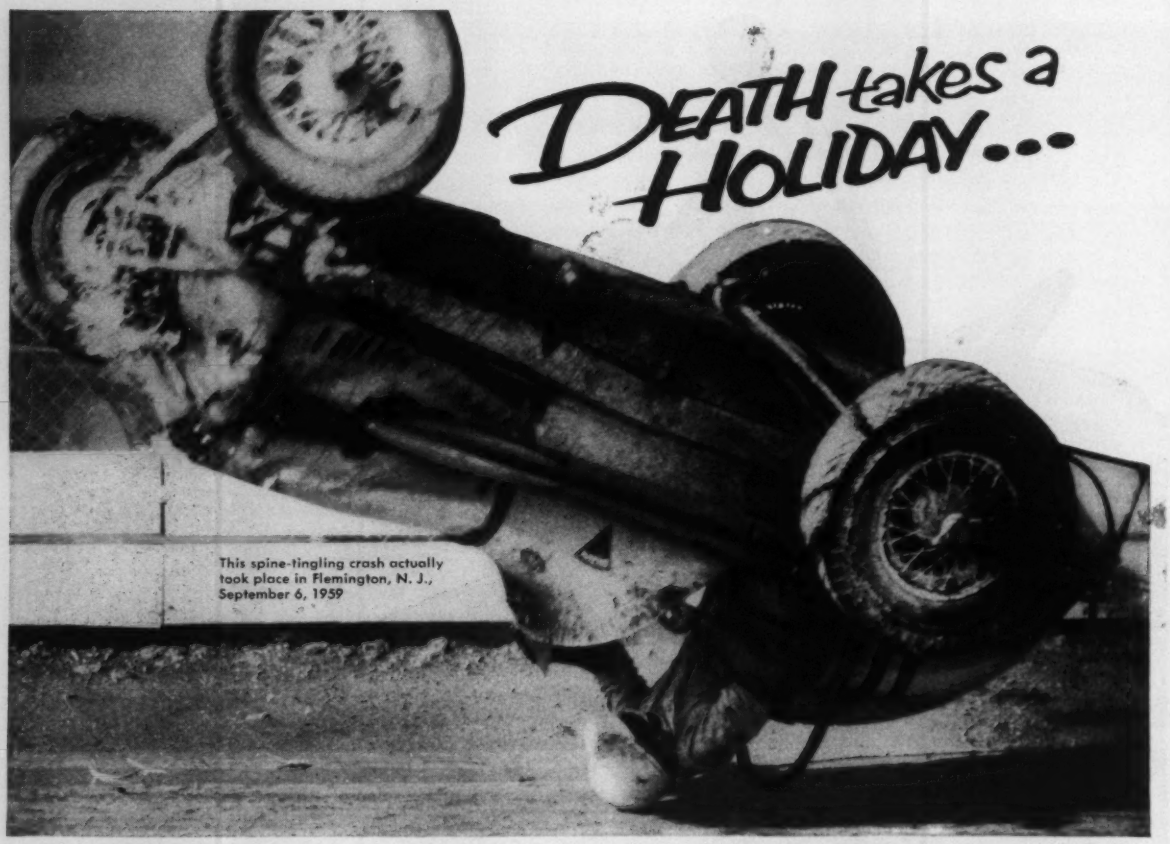

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Seamless Mechanical Tubing
Welded Mechanical Tubing
Pressure & Hydraulic Tubes
Centrifugally Spun Tubing
Stainless Seamless Tubing
Stainless Welded Tubing
Stainless Pipe, Valves & Fittings
Aluminum Tubing, Pipe & Fittings

Call FRASSE 1st for tubing

Spectators gasped when this sprint car skidded—at 95 m.p.h.—into a series of flips that seemed certain to demolish both car and driver. Yet—miraculously, the driver walked away from the wreck with only minor bruises. His roll bar—made from Frasse tubing—had shielded him by taking the full impact of the car...not once, but *four times.*

The capacity to take such abuse is inherent in seamless tubing. It combines the ability to absorb and localize shock, with the ultimate in strength and rigidity in proportion to size and weight. Then too, it possesses superior welding and machining properties. That's why more and more engineers specify seamless tubing... for structural and mechanical applications.

Every tube in Frasse stocks meets the rigid quality specifications set by Frasse tubing specialists. So, if you use tubing in your product —and want trouble-free quality in a hurry...*it will pay to make Frasse your source for tubing.* There's a size on hand to meet every need...delivery is immediate...and Frasse engineers are available to assist you with any problem involving a tubular product.

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Electronic parts courtesy Judson Mfg. Co., Inc., Cornwells Heights, Pa.

Mirror-bright without polishing, after switch to Sunicut

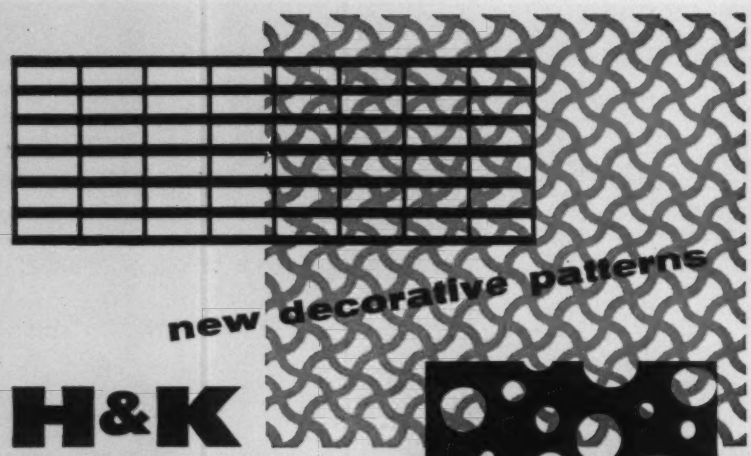
Boring on a multiple-spindle automatic produced the finish you see on these electronic parts. Sunicut 102-S Cutting Oil saved time and money by eliminating the polishing operation. The same automatic uses Sunicut 102-S to machine metals ranging from titanium to stainless 410.

Sunicut 102-S is one of a full line of cutting oils known throughout metalworking for maintaining long tool life, close tolerances, and fine finishes. There's a grade of Sunicut that can help you improve your product quality—and *that's* the best economy of all.

To choose the right Sunicut, ask the Sun man; that's part of his service to you. Or write to SUN OIL COMPANY, Dept. S-4, *Philadelphia 3, Pa. In Canada: Sun Oil Company Limited, Toronto and Montreal.*

SUNOCO

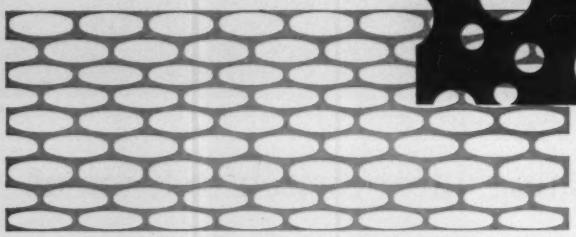
MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

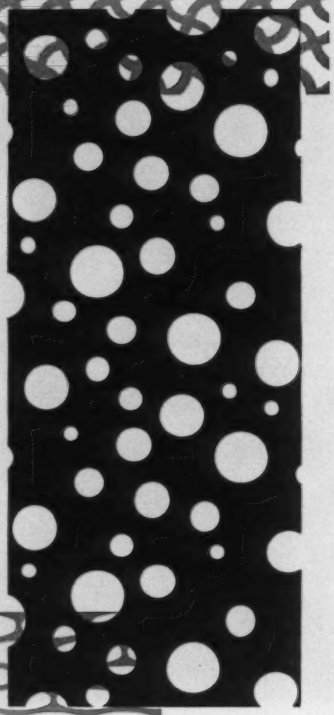


H&K
perforated materials

Passage or control of air, sound, light or fluid . . . decorative concealment . . . component protection . . . eye catching, sales-building beauty—if your product requires any or *all* of these features, you'll find the design and functional versatility you need in the Harrington & King line of perforated materials. Just four of H & K's new patterns are illustrated here. There are many more contemporary and traditional designs, all available in steel sheets for shipment from stock.

And there is also a vast selection of additional patterns and open areas which can be custom fabricated from existing dies. H & K can perforate practically any material. May we put our more than 75 years of experience to work for you?





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Apr. 4-6, Metallurgical Society of AIME: Annual national open hearth steel conference and blast furnace, coke oven, and raw materials conference, Palmer House, Chicago. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Apr. 4-6, National Industrial Conference Board Inc.: Annual atomic energy conference, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Apr. 4-7, American Management Association: Packaging show and conference, Convention Hall, Atlantic City, N. J. Association's address: 1515 Broadway, New York 36, N. Y.

Apr. 4-7, Nuclear Congress and Atomic Exposition: Coliseum, New York. Coordinator: Engineers Joint Council, 29 W. 39th St., New York 17, N. Y. Secretary: E. Paul Lange.

Apr. 5-8, Society of Automotive Engineers Inc.: National aeronautic meeting, production forum, and engineering display, Hotel Commodore, New York. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Apr. 5-14, American Chemical Society: National meeting, Public Auditorium, Cleveland. Society's address: 1155 16th St. N.W., Washington 6, D. C. Executive secretary: Alden H. Emery.

Apr. 6-8, American Zinc Institute Inc. and Lead Industries Association: Joint conference and annual meetings, Chase-Park Plaza Hotel, St. Louis. Information: LIA or AZI, 60 E. 42nd St., New York 17, N. Y.

Apr. 12-14, Steel Shipping Containers Institute Inc.: Annual meeting, Breakers Hotel, Palm Beach, Fla. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Apr. 13-14, Malleable Founders' Society: Market development conference, Edgewater Beach Hotel, Chicago. Society's address: 781 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

Apr. 18-19, Conference on Automatic Techniques: Sheraton-Cleveland Hotel, Cleveland. Sponsors: ASME, IRE, and AIEE. Information: J. H. McRainey, Room 530, 1213 W. Third St., Cleveland 13, Ohio.

Apr. 18-20, American Machine Tool Distributors Association: Semiannual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelley.

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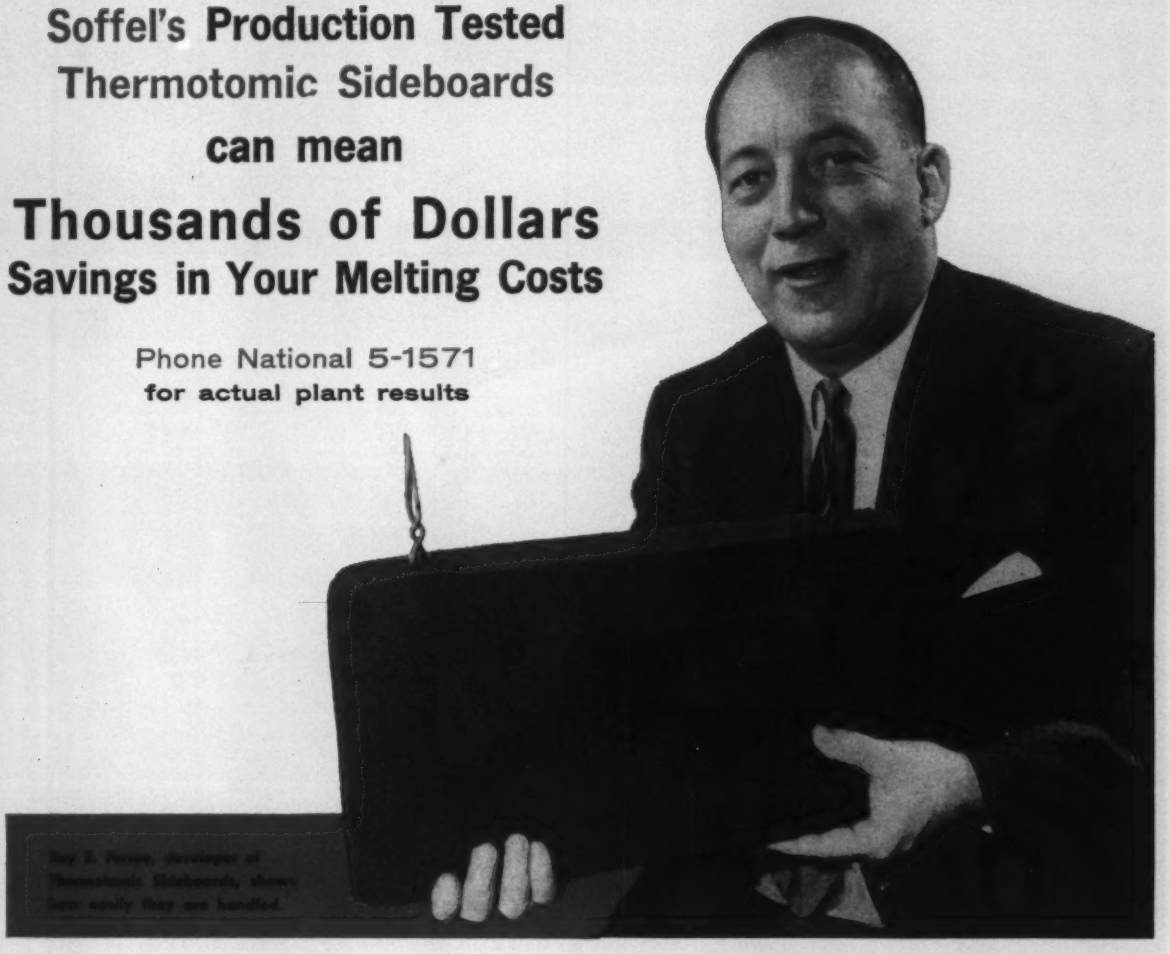

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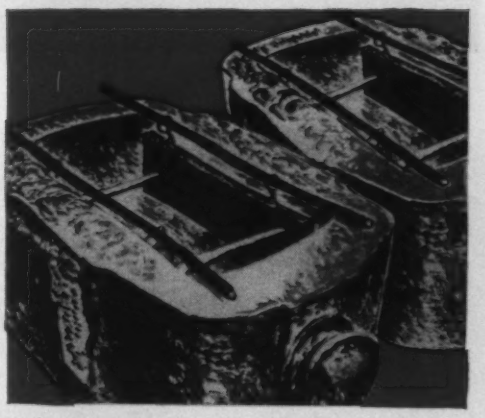

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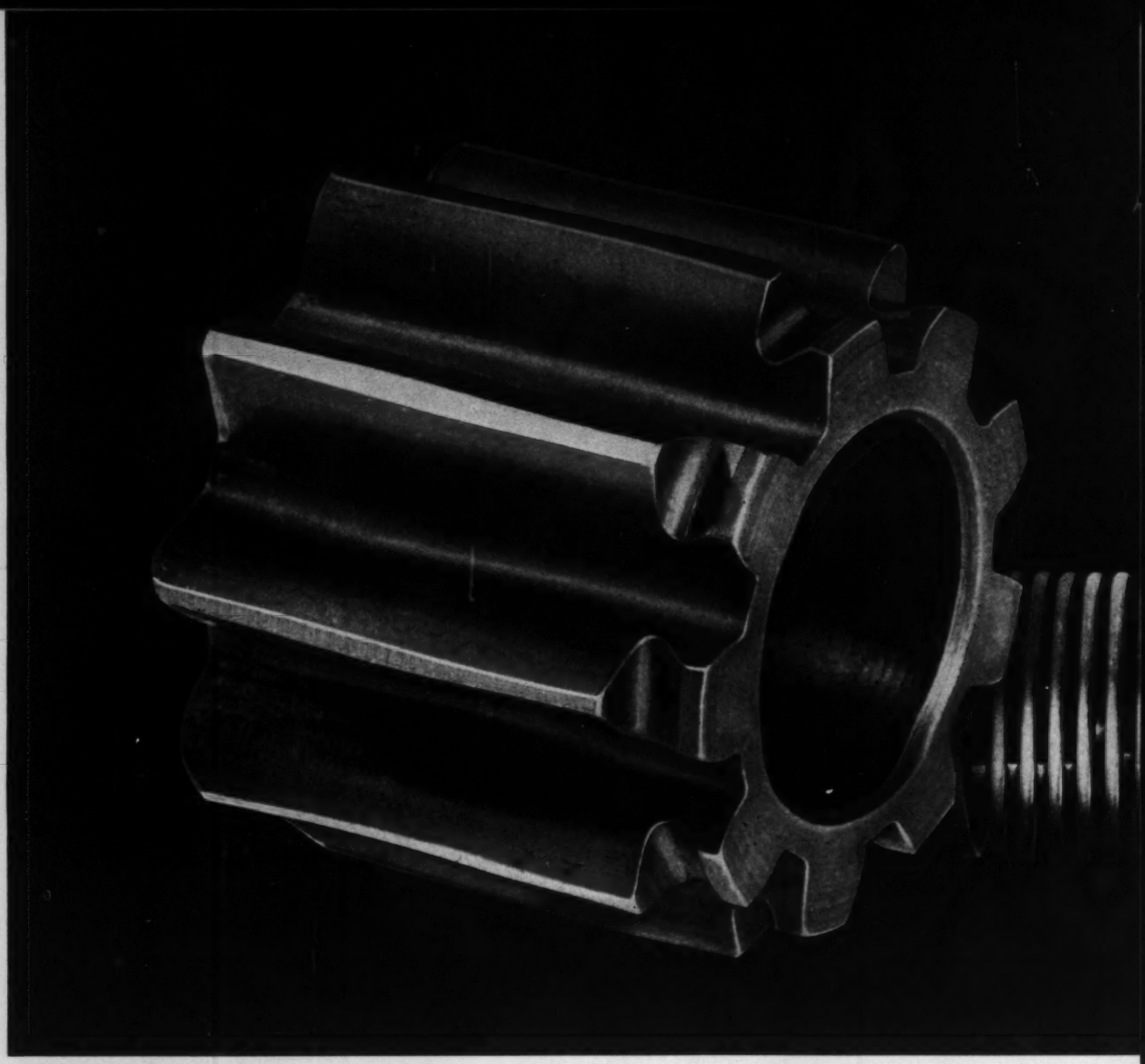

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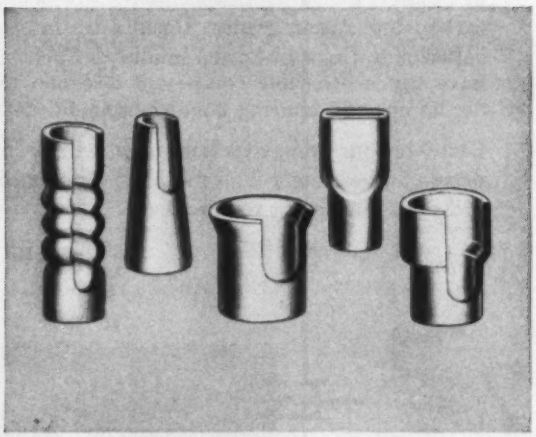

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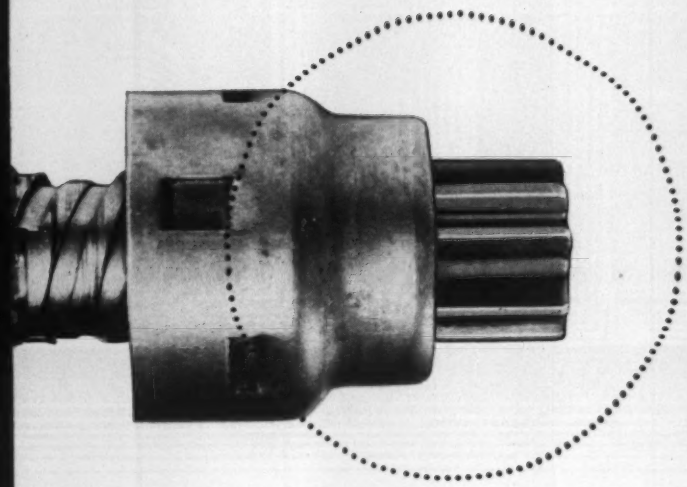

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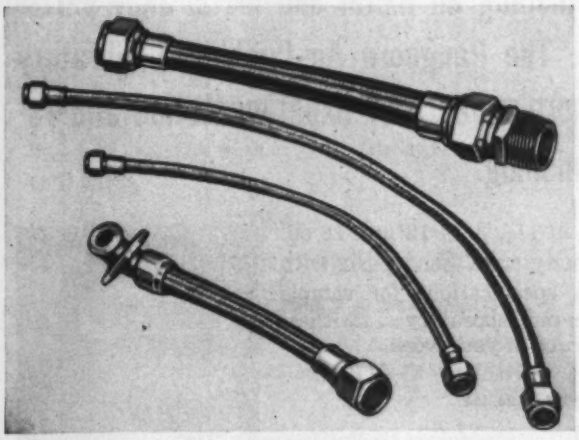

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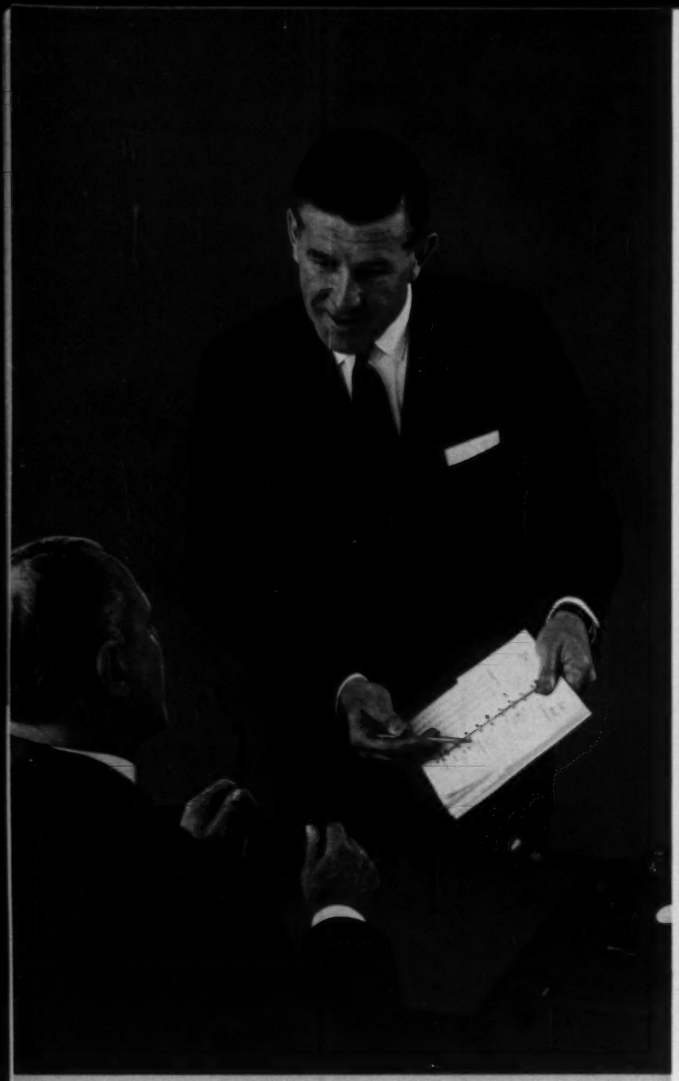

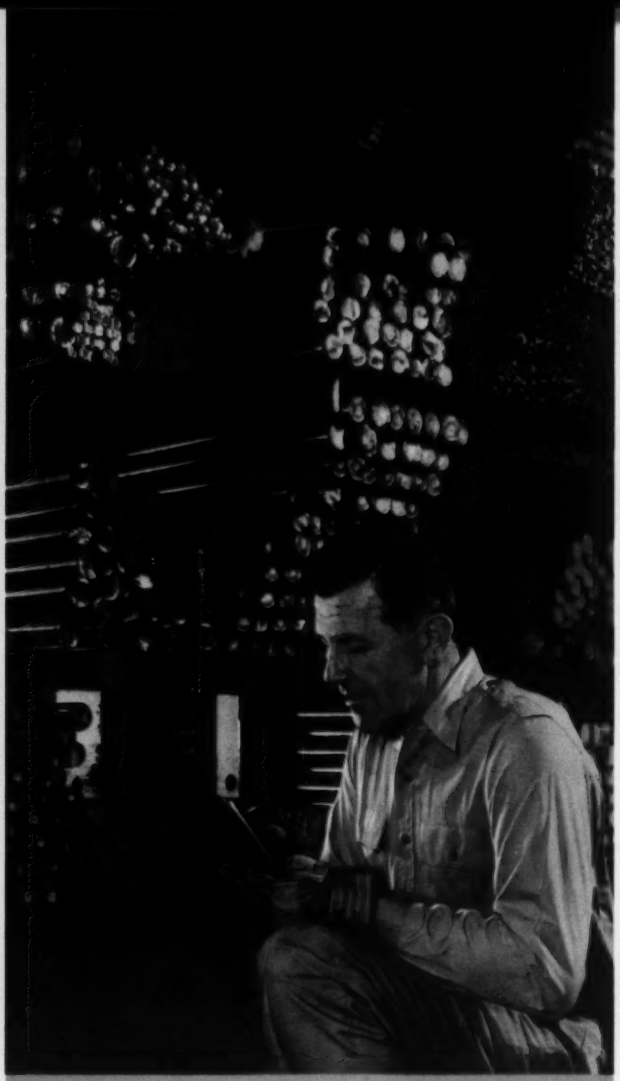

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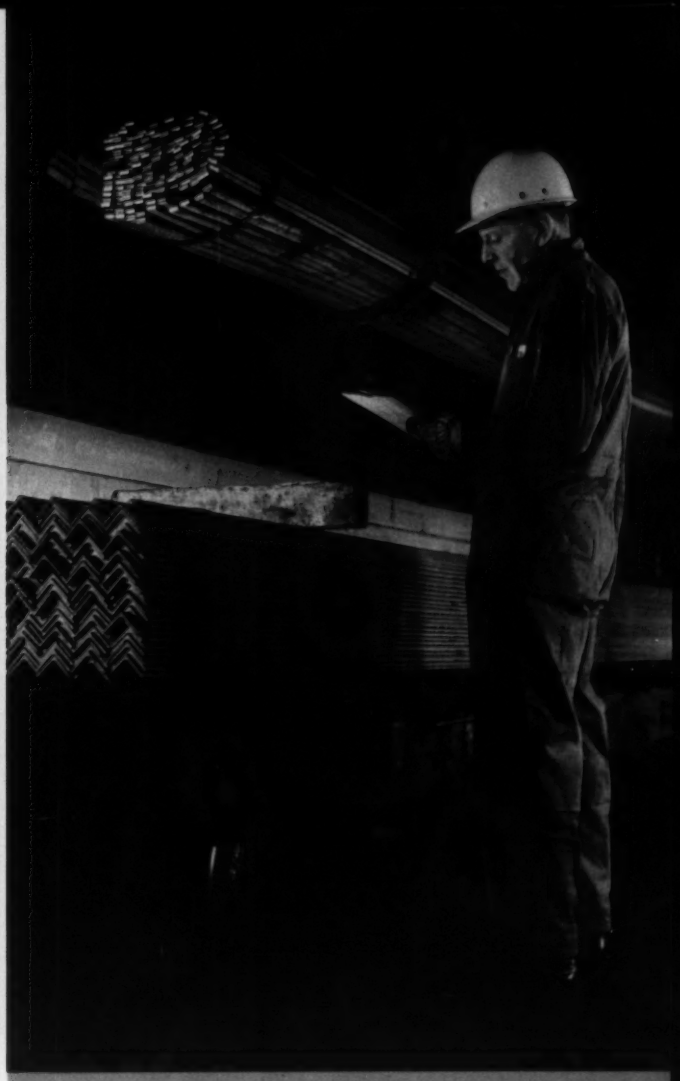

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Your Steel Service Center representative is a good man to get acquainted with. He knows steel . . . and what can be done with it. He can draw freely on a staff of technical experts. He's set up to handle your steel needs—especially if you need steel fast, if you need steel only occasionally, or if you need steel in limited quantities.

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- Cutting and burning _____
- Scrap and wastage _____

Obsolescence _____
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TOTAL _____

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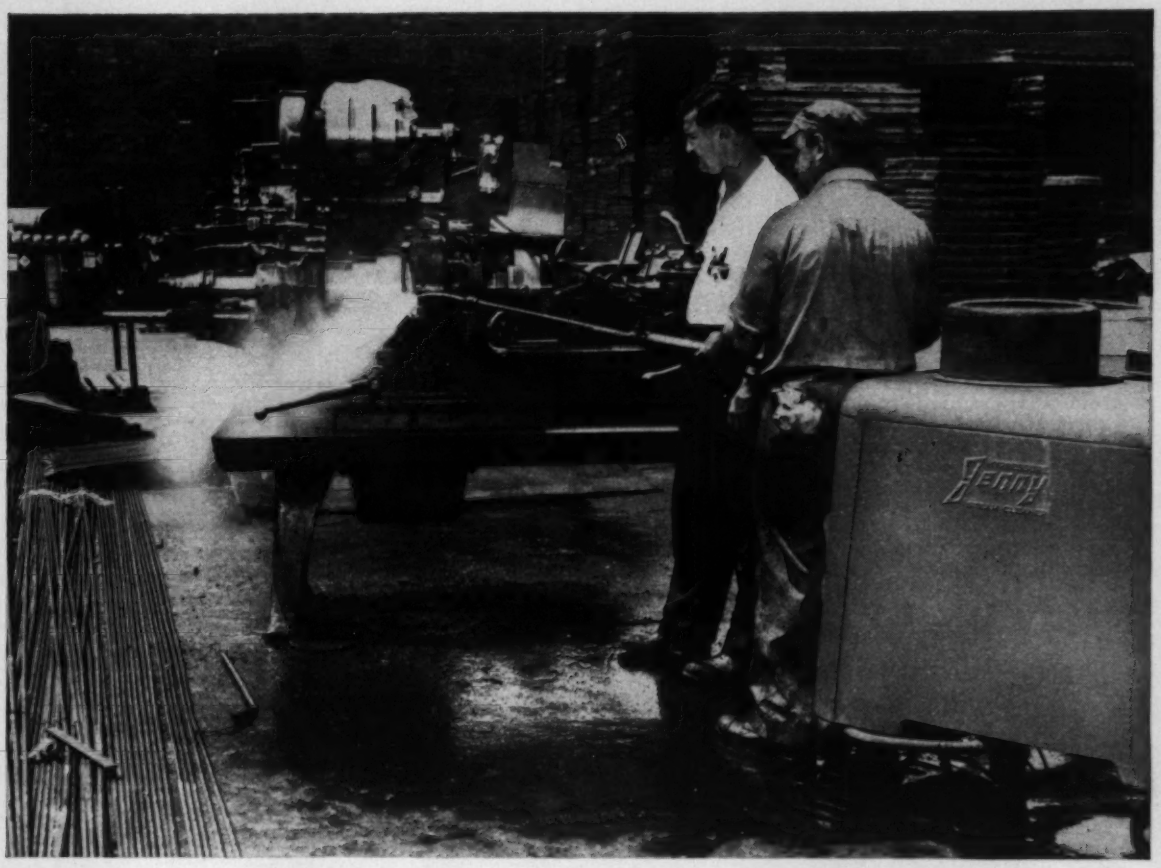
TOTAL _____



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Now, Jenny is used in the company's plant housekeeping program, and it has helped to establish them as one of the cleanest and safest plants in the country.

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Mail the coupon today for additional facts or free demonstration. You'll be glad you did!

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Foundries claim production savings will total millions

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1. Chips into hopper.
2. 10" pipe leads to Roxy charging valve.
3. Roxy valve which controls the shooting action that delivers an accurate quantity of chips into the cupola.
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Roxy Chip Injector to cupola (patented)

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Complete factory supervised maintenance can be included in any of the above plans.

You'll find Towmotor-Gerlinger handling economies consistently pay the small monthly cost many times over. For complete information on any of these profitable, money saving plans, write or contact Towmotor-Gerlinger Rental Division, Towmotor Corporation, Cleveland, Ohio.

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WHAT IS KAISER BLAST FURNACE CASTABLE? It is a dry-mix gunning material for the full range of blast furnace lining, including area below the tuyeres. The material is a hydraulic setting, high strength clay product made with a very pure calcium aluminate binder (low in iron to resist effect of CO disintegration, and high in strength to resist abrasive conditions).

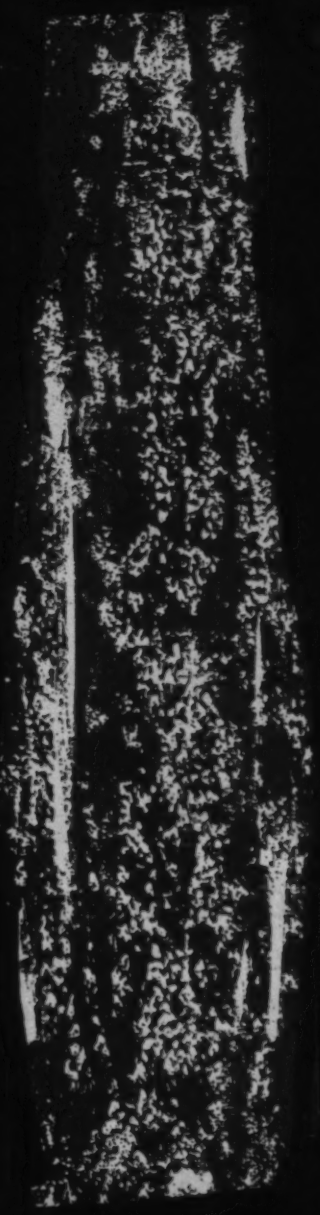
WHEN SHOULD IT BE USED? Kaiser Blast Furnace Castable was developed specifically to provide a quick, economical and dependable means of prolonging furnace life without a major reline. Thus, it may be used when a furnace must be kept on the line to meet heavy production schedules, or it may be used to improve production economy by extending normal productive life of a furnace.

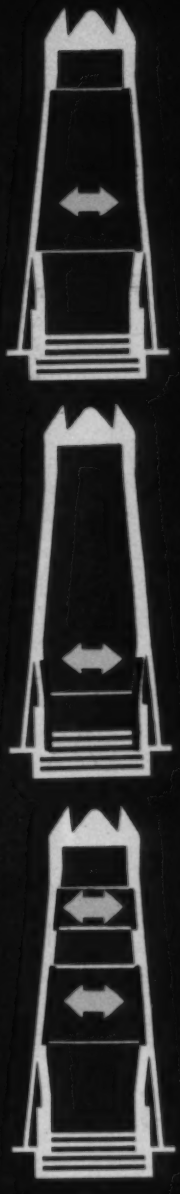
HOW FAST CAN THE MATERIAL BE PLACED? When down time is an important consideration, Kaiser Blast Furnace Castable can be gunned into place—around the clock—at a rate of up to 9000 pounds per hour per gunning unit. Service can be resumed in a fraction of the time needed for other methods of repair or rebuild! Curing is accomplished with normal heat-up procedure. (Actual down time varies, of course, with amount of surface preparation—cleaning slag, coke, limestone, etc. from the existing brickwork.)

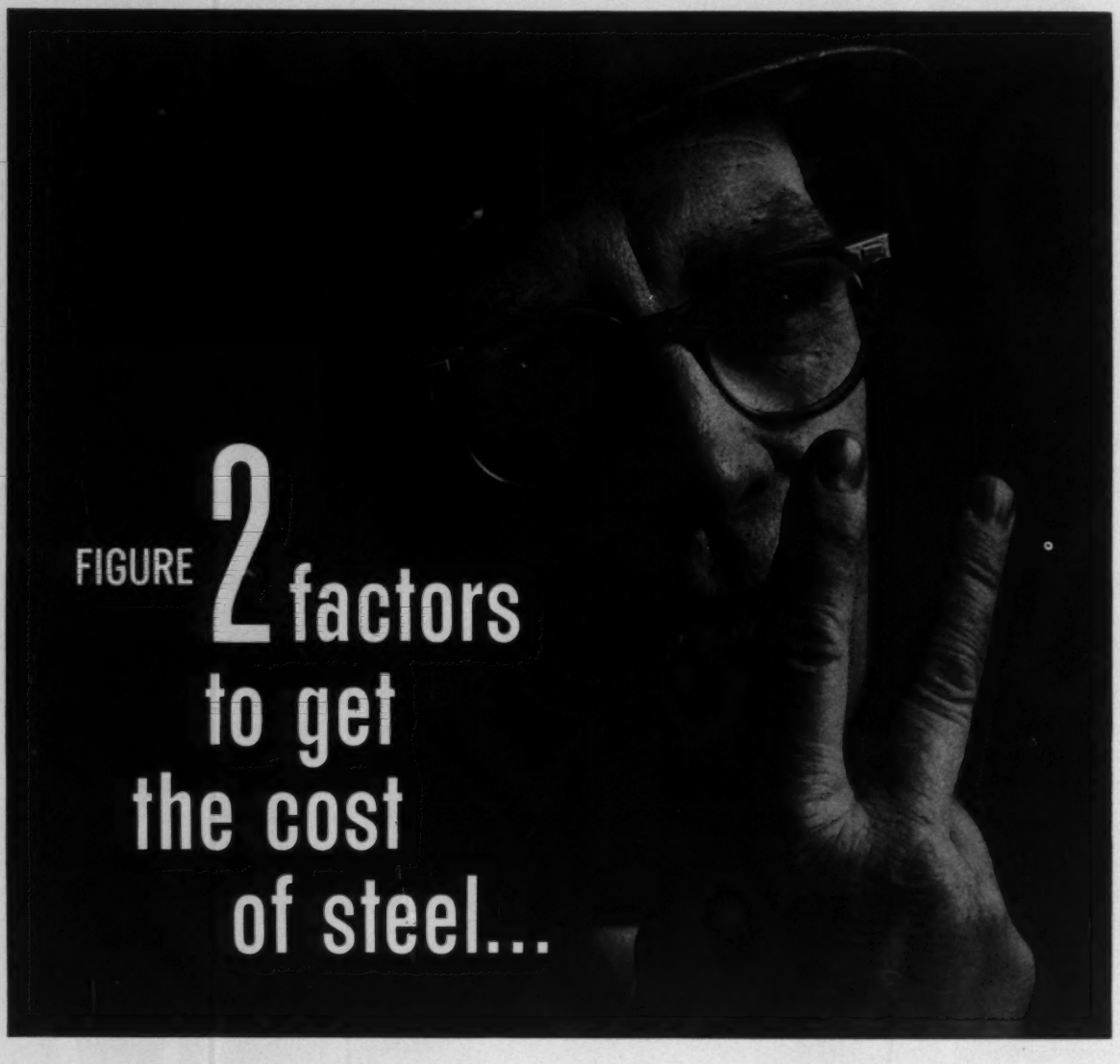
WHAT IS THE COST AS COMPARED TO BRICK? Cost of actual repairs made with Kaiser Blast Furnace Castable is only about one-fourth the cost of repairs made with brick. Even more important, cost- and profit-wise, is the additional iron production made possible by increased campaign life.

HAS KAISER BLAST FURNACE CASTABLE BEEN PROVED IN SERVICE? Yes. The three locations described at right show the range of installations now in service.

*Formerly MEX-R-CO BF Blast Furnace Castable.







COST OF POSSESSION is an important addition to price!

What are the costs of possession when you put steel in inventory? Many are hidden. Run your eye down the chart at the right . . . it will help you find them.

Many smart, well-informed steel users find they save money by using the stocks, facilities and technical knowledge of their Steel Service Centers. They deliver steel when you want it, cut to exact size, ready for use. Your capital is freed for more profitable use.

Compare *all* of your costs, including *cost of possession*, with the price and *freedom from risk* of buying steel from your Steel Service Center. Get the booklet, *What's Your Real Cost of Possession for Steel?* from your nearby Steel Service Center. Or write to Steel Service Center Institute, Inc., 540-G Terminal Tower, Cleveland 13, Ohio.

COST OF POSSESSION FOR STEEL IN YOUR INVENTORY

Per ton delivered	_____
Cost of capital:	
Inventory	_____
Space	_____
Equipment	_____
Cost of operation:	
Space	_____
Materials handling	_____
Cutting & burning	_____
Scrap & wastage	_____
Other costs:	
Obsolescence	_____
Insurance	_____
Taxes	_____
Accounting	_____
TOTAL	_____

COST OF FREEDOM-FROM-RISK STEEL FROM YOUR STEEL SERVICE CENTER

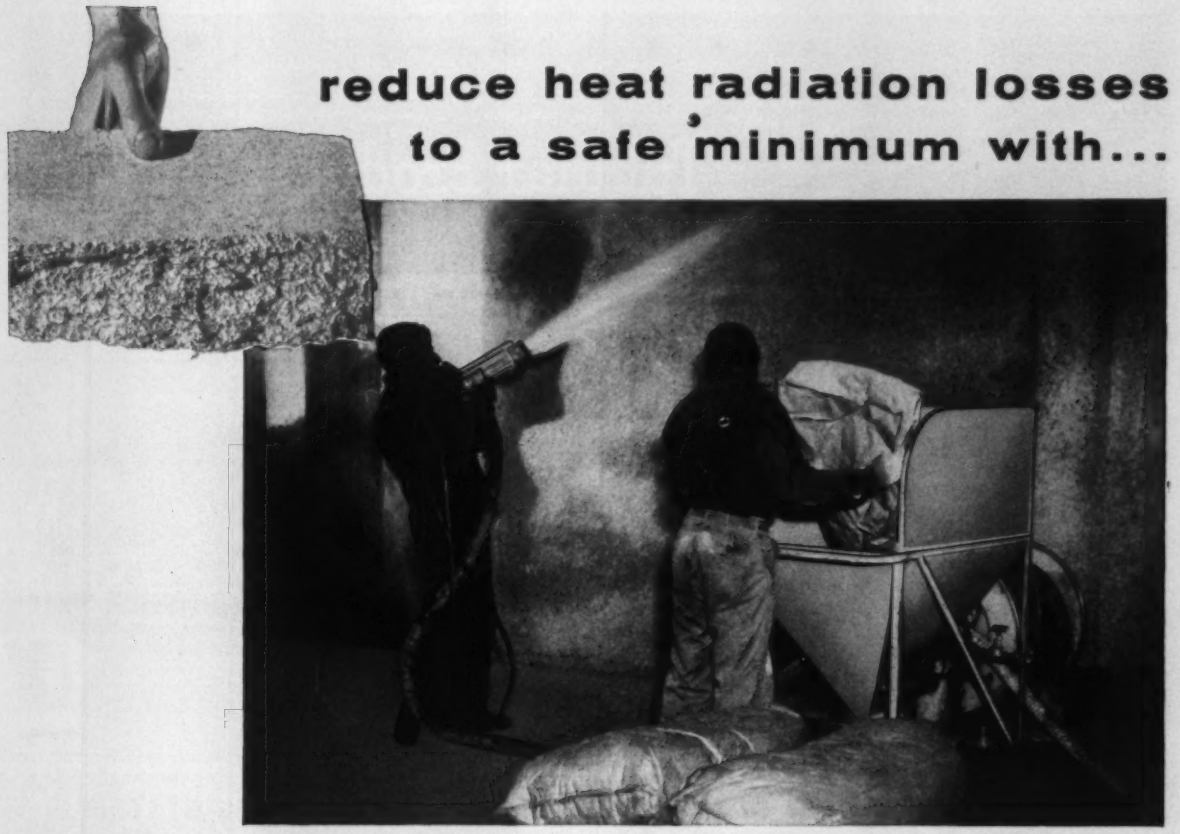
Per ton, cut-to-size, and delivered

TOTAL _____

STEEL SERVICE CENTER INSTITUTE

. . . YOUR STEEL SERVICE CENTER

reduce heat radiation losses to a safe minimum with...



THERM-O-FLAKE HIGH TEMPERATURE INSULATION

THERM-O-FLAKE COATING . . . ideal for sealing furnace walls by applying as a thin layer directly on the furnace brickwork. Sticks tightly and forms a highly impermeable coating.

THERM-O-FLAKE L. B. INSULATION BLOCK . . . a back-up insulation with high mechanical strength. Used extensively for open hearth and processing furnaces, hot blast stones, etc. Available in standard flat blocks and special shapes to order.

THERM-O-FLAKE BRICK . . . provides high insulating efficiency and stability at temperatures to 2000°F. Very lightweight. Absorbs expansion stresses of refractory brickwork without disintegration. One inch thickness is equivalent to 6½ inches of fire brick in resisting heat transfer.

THERM-O-FLAKE GRANULES . . . an extremely light weight, loose fill insulation for temperatures up to 2000°F. Composed of selected, graded particles of pure exfoliated vermiculite. Will not crumble, rot or disintegrate, non-irritating.

THERM-O-FLAKE CONCRETE . . . insulating concrete recommended for a maximum hot face exposure of 2000°F. Weighs only 40 lbs. per cubic foot. A one inch thickness is equivalent in insulating value to two inches of diatomaceous earth type concretes.

Goose Lake THERM-O-FLAKE Insulation products are specifically produced for open hearth furnaces and other steel plant installations requiring an efficient insulation material for temperatures up to 1900°F. They are made from a base of exfoliated vermiculite, the most stable and efficient high temperature insulation available. THERM-O-FLAKE Insulation products are approved and used regularly by most steel plants in the United States. Write today for complete information.

ILLINOIS CLAY PRODUCTS CO.

Main Office—Barber Building, Joliet, Illinois
Sales Office—208 South LaSalle Street, Chicago 4, Illinois

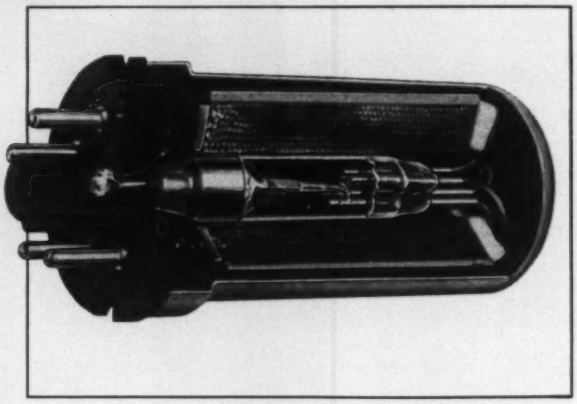
MANUFACTURERS OF: GOOSE LAKE Ladle Brick, Ground Fire Clay, Fire Clay Flour; GRUNDITE Bond Clay; FIROX; THERM-O-FLAKE Insulation Coating, Brick, L.B. Block, Concrete; CHEM-BRIX, Silica, Carbon

BISHOP Tubular Products NEWS

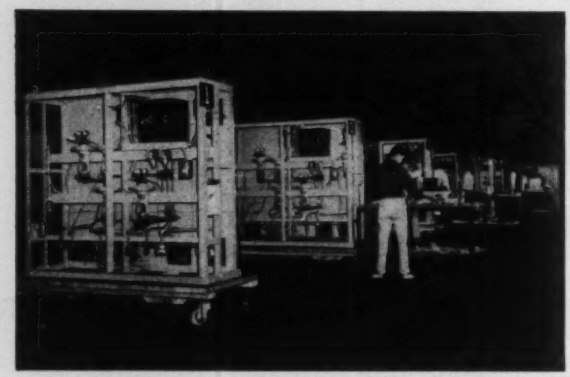
"METALS FOR PRECISION AND PERFORMANCE"

C. P. CLARE'S MERCURY-WETTED CONTACT RELAYS PERFECTLY SEALED WITH GLASS-TO-METAL SEALING ALLOY

C. P. Clare & Company, Chicago, Illinois, produces a complete line of mercury-wetted contact relays characterized by long life, high speed of operation and no contact bounce. To supply relays that have a conservative life expectancy of more than a *billion* operations requires absolute perfection in all phases of manufacturing. C. P. Clare uses BISHOP's #52 alloy tubing for the critical tubular stems of these relays. Mercury and hydrogen at 150 psig are introduced through this connecting stem—which is then sealed off by welding and forging. Can glass-to-metal sealing alloys solve any of your problems? BISHOP makes a complete line . . . use the coupon for details.



TUBING TAKES 5,400 PSI IN HONEYWELL'S MISSILE CHARGING SYSTEM



Super pressure stainless steel tubing connects many components of the cubicles illustrated. Minneapolis-Honeywell's Missile Equipment Division, Pottstown, Penna. builds these control cubicles that make up the gas charging system for the Bomarc missile. BISHOP supplies Honeywell with two sizes of 304 seamless super pressure tubing for this application. During charging of the missile, tubing handles pressures up to 5,400 psi. If you use small diameter tubing—super pressure, commercial quality or other—consider BISHOP. Use the coupon for a copy of BISHOP's Tubular Products Bulletin.

J. BISHOP & CO.

platinum works

FOR HELPFUL DATA USE THIS HANDY COUPON

- ☐ Glass-To-Metal Sealing Alloy Data
- ☐ Tubular Products Bulletin No. 12
- ☐ Special Tubing Data
- ☐ Platinum Products Catalog No. 4

Check information you'd like and mail to
J. BISHOP & CO.,
30 King St., Malvern, Penna.

Name

Position

Company

Address

City Zone State

Tubular Products Division

30 KING STREET, MALVERN, PENNA.

NIagara 4-3100

THIS IS THE BISHOP LINE:

Products of all the Platinum Metals... Small diameter Stainless Steel, nickel and special alloy tubing

Photo courtesy Acme Steel Company, Riverdale, Illinois.

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

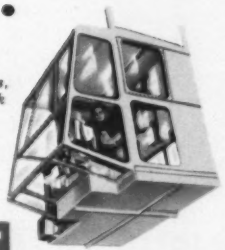
IN STEEL MILLS: This 100-ton P&H crane lifts, transports and "spots" tremendous loads of molten steel as surely and deftly as you handle a coffee cup.

P&H steel mill cranes perform tasks like this effortlessly and dependably because they are specifically designed for steel mill service . . . to handle massive loads, withstand searing heat, ignore frequent shock loads.

What's more, P&H carefully engineers every crane to meet specific job requirements . . . to consider all factors affecting performance. Special operating problems are taken in stride. Result: P&H cranes chalk up almost unbelievable service records month after month, year after year, decade after decade.

Isn't this the kind of performance you want, too? Write for bulletin C-42 to Dept. 120, Harnischfeger Corporation, Milwaukee 46, Wis.

P&H enclosed cabs have full-view safety glass windows, for unrestricted view of work area. Cabs can be heated and air conditioned where cold, heat, smoke or fumes render ordinary cabs uncomfortable or unsafe.



P&H
OVERHEAD CRANES

HARNISCHFEGER
Milwaukee 46, Wisconsin

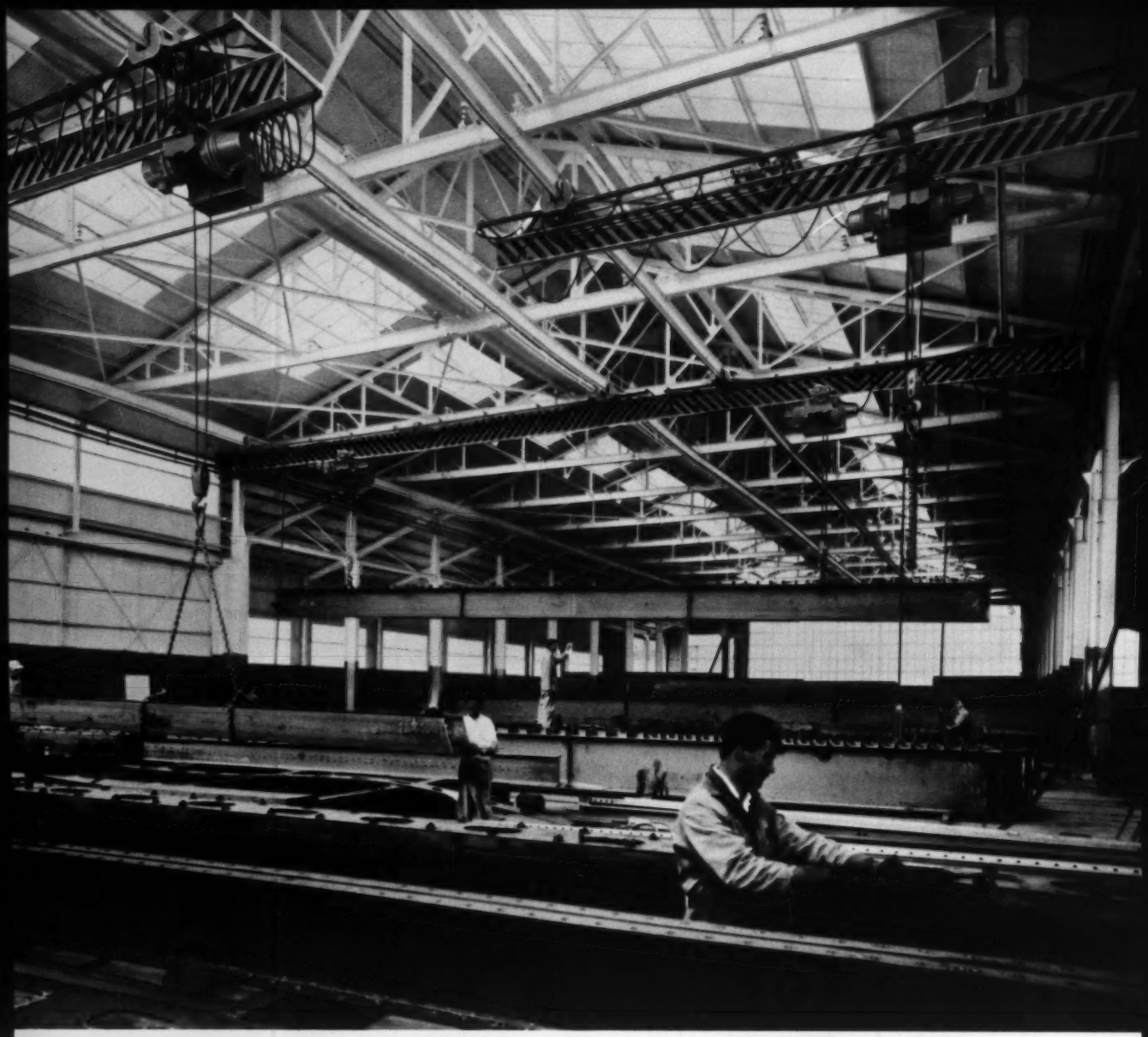


Photo: Courtesy Isaacson Iron Works Co., Seattle, Washington

P&H PRECISION CONTROL SPOTS HEAVY STEEL ACCURATELY, SAFELY

This West Coast steel-fabricating company depends on P&H Balanced Design Hevi-Lift hoists to keep heavy steel beams and fabricated structures moving through its shops.

Note the unique method of installation which provides a high degree of flexibility . . . hoists can be used alone — or hoists can be teamed up to handle extra-long sections.

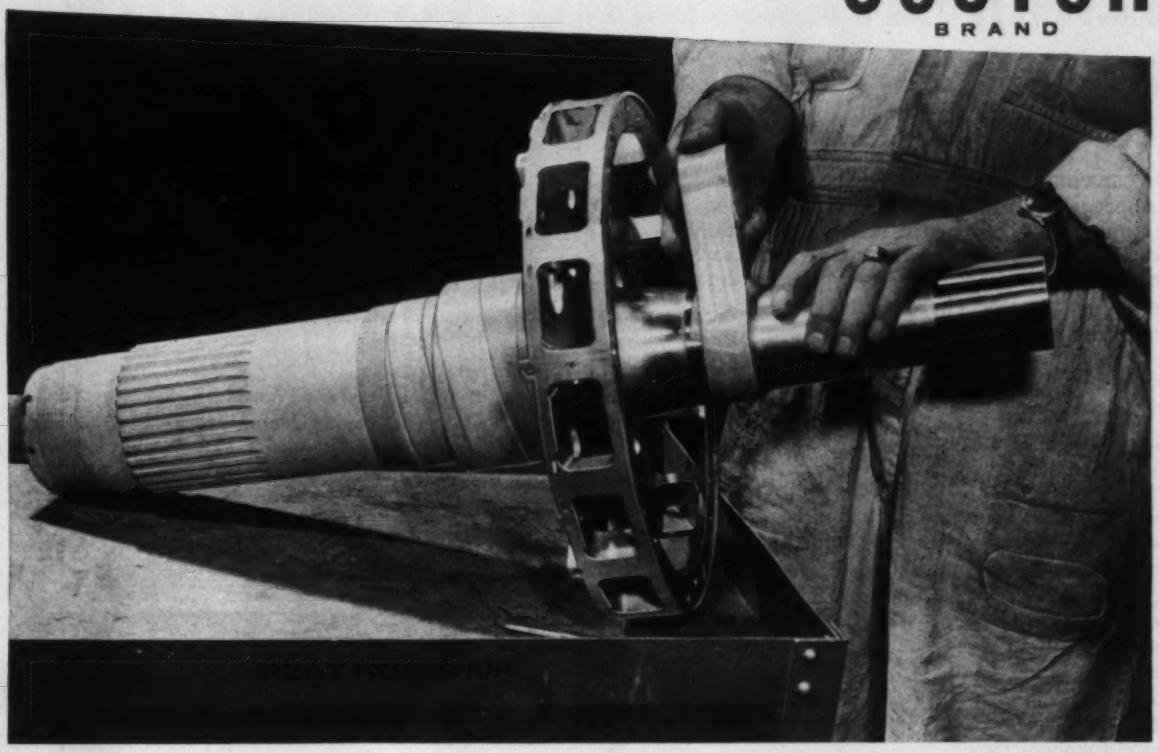
This company selected P&H Balanced Design Hevi-Lifts because they will stand up longer, under heavier duty cycles — with less maintenance — than any other hoist they could buy. Reason: Balanced Design means that every component has been balanced with every other component for maximum strength and performance characteristics.

If uninterrupted through-the-air material handling is important to you, too, then it will pay you to find out more about these new hoists. Send for bulletin H-55, Dept. 222, Harnischfeger Corporation, Milwaukee 46, Wis.

HARNISCHFEGER
Milwaukee 46, Wisconsin

P&H
HEVI-LIFT
HOISTS

SCOTCH
BRAND



TAPEnology... industry's newest cost-cutting tool

Tape masks off difficult areas easily ...for positive plating protection

Speed up and simplify your plating operations with "SCOTCH" BRAND Plastic Tape No. 470. Sticks at a touch. Conforms to most shapes. Safely seals off areas not to be plated and eliminates "creeping under" action. Results in clean, sharp-line plating.

"SCOTCH" Plastic Tape No. 470 ends costly machining time needed to reduce excess build-up that often results when other masking agents are used. 470's tough vinyl plastic backing withstands the effects of acids, alkaline solutions, most hydrocarbons, and other solvents used in plating operations.

What's your plating problem? Chances are your nearest "SCOTCH" BRAND Tape Distributor can solve it for you. Ask him, or write: 3M Co., 900 Bush Avenue, St. Paul 6, Minn.

When tape costs so little, why take less than "SCOTCH" Brand?

"SCOTCH" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.
EXPORT: 99 PARK AVE., NEW YORK 16. CANADA: LONDON, ONTARIO.

MINNESOTA MINING AND MANUFACTURING COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW
3M COMPANY

SCOTCH BRAND
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General Electric's program of Automation through Modernization can help you...

ELIMINATE CHARGING ERRORS, INCREASE FURNACE PROFITS

You can eliminate charging errors which result in unpredictable furnace operation and product quality. Now, with advanced system knowledge and new equipment developments, General Electric can automate your charging system. Automated charging of your furnace with raw materials in chemically correct proportions and in the correct sequence will give you uniform furnace operation, predictable quality, increased production, lower coke rate.

AS A FIRST STEP toward realizing these profitable benefits of automation, General Electric will help you survey your stockhouse, scale-car, and electric equipment for modernization needs. In this way, you can be sure that every component of your materials-handling system is compatible with the precise demands of automation. Then, by co-ordinating into your electrical system x-ray sensing equipment for continuous analysis of raw materials and computer equipment for burden calculating and charging direction, you will achieve fully automated furnace-charging.

ADDITIONAL SYSTEM BENEFITS will be realized through automatic acquisition of process data which have never before been available in readily usable form. Availability of these time-correlated data will make possible analysis of the process to determine the controlling relationships among blast volume, temperature, moisture, enrichment; composition of stack and top gases and raw materials; tuyere proportioning; and top pressure. When these controlling relationships are determined, the computer system can be programmed to provide immediate and accurate process direction.

ADOPT GENERAL ELECTRIC'S step-by-step program and begin now enjoying benefits of automation while you are building, practically and economically, toward the ultimate in profitable furnace operation — complete process direction from raw materials to finished iron.

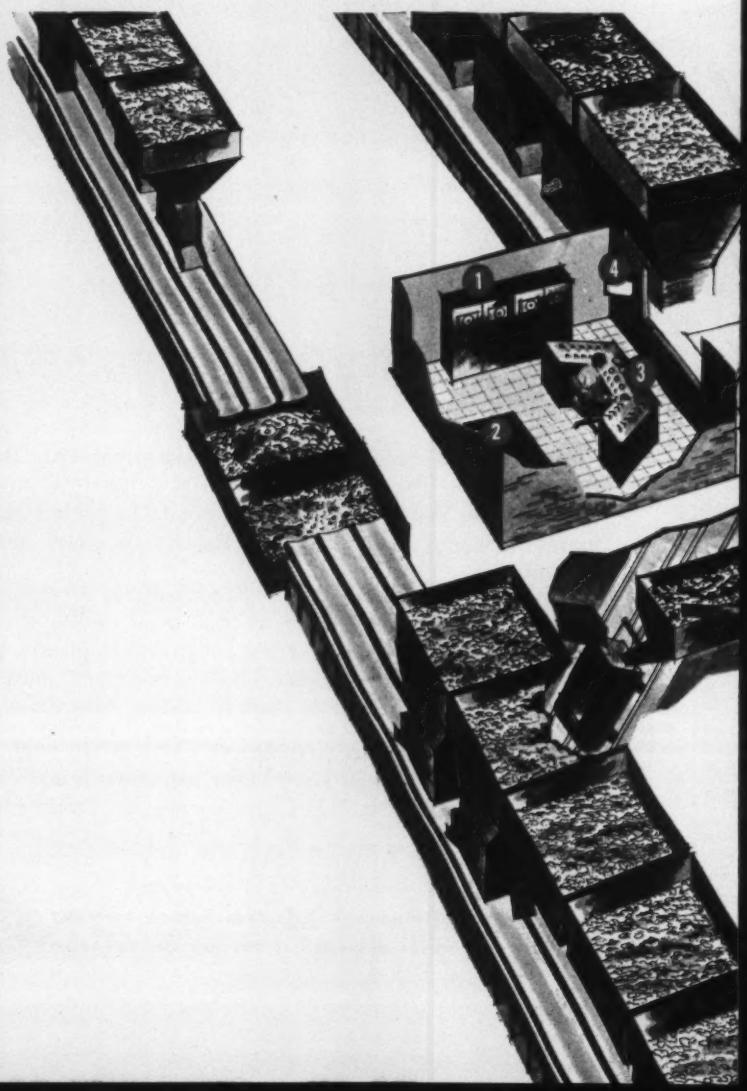
For details on this Automation through Modernization plan, call your local General Electric Apparatus Sales Office. And write for *Ring of the Future* kit, Section 659-132, General Electric Company, Schenectady 5, New York.

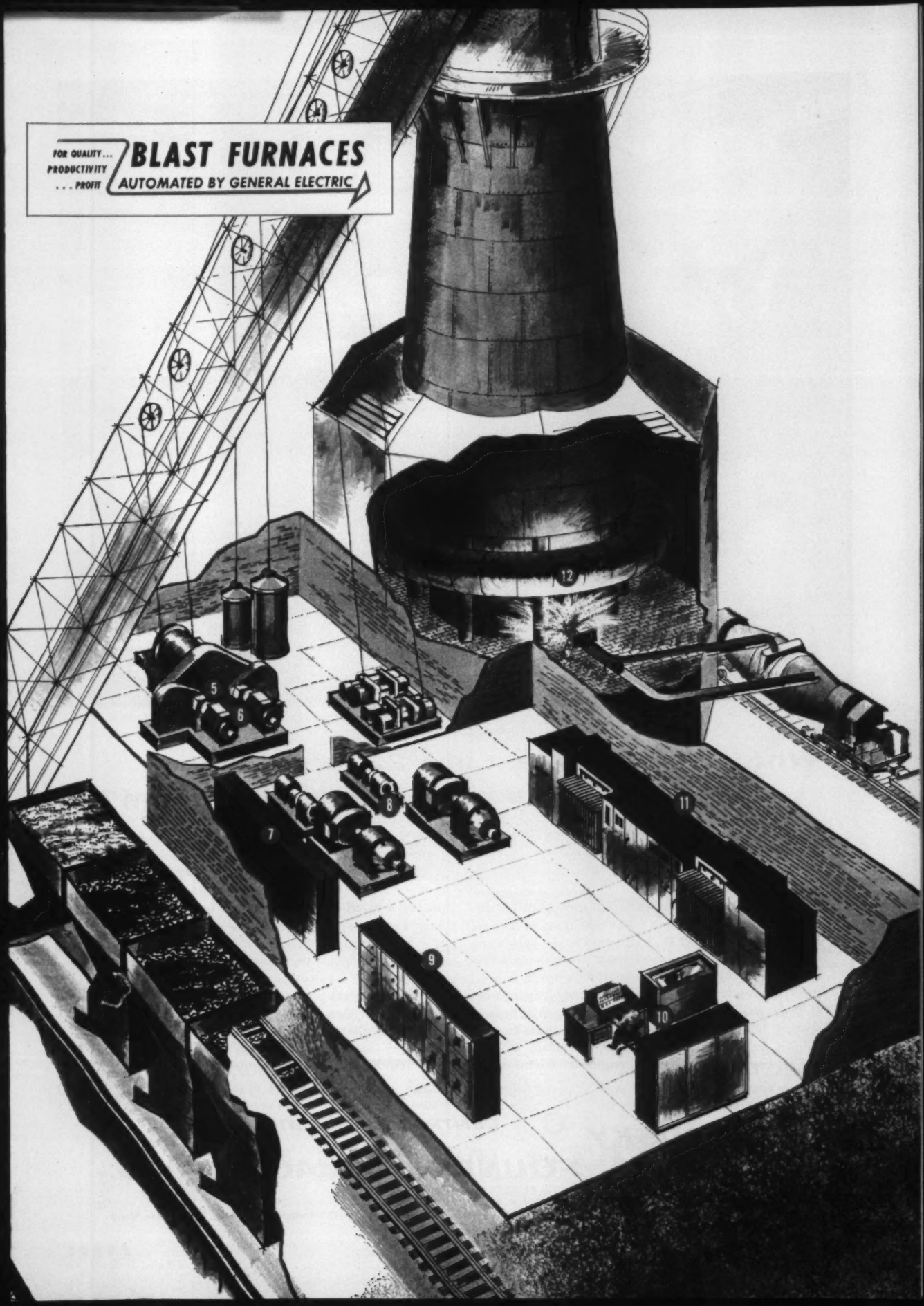
MODERNIZE FOR PROFITS

GENERAL ELECTRIC

SYSTEM-ENGINEERED ELECTRICAL EQUIPMENT

1. Recording and indicating instruments.
2. X-ray equipment for raw-materials analysis.
3. Operator's console.
4. Intra-tel closed-circuit television.
5. Heavy-duty brakes.
6. D-c mill motors.
7. Skip-hoist and d-c auxiliary drive control; DIRECTO-MATIC static charging control.
8. Skip-hoist motor-generator sets.
9. Motor-control centers.
10. GE-312 digital computer system.
11. Selectively Co-ordinated load-center unit substation.
12. Blast from steam-turbine or electric-driven blowers.




FOR QUALITY...
PRODUCTIVITY
...PROFIT
BLAST FURNACES
AUTOMATED BY GENERAL ELECTRIC
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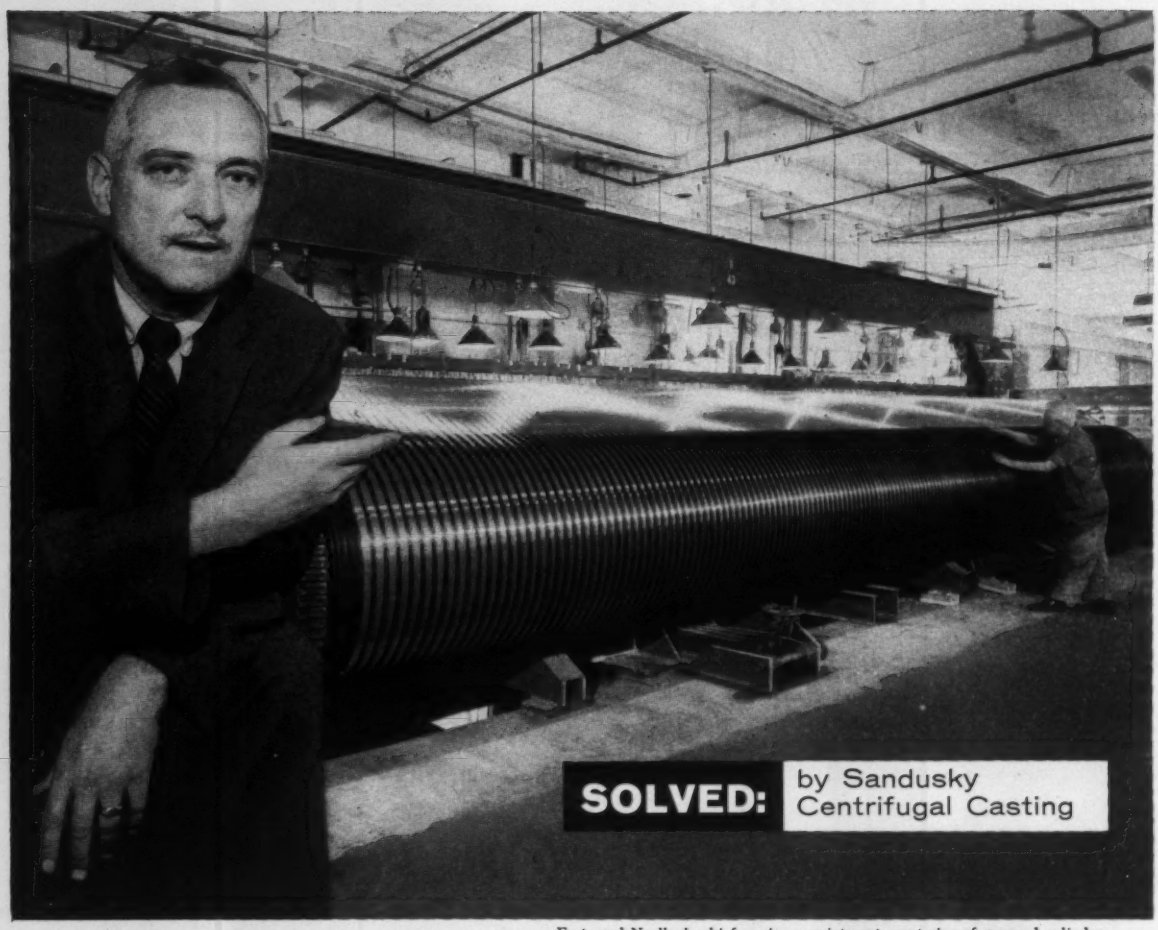


Eastwood-Nealley's chief engineer points out great size of grooved cylinder

Who else could cast this 22-ton cylinder for the world's biggest wire cloth loom?

To weave Fourdrinier wires up to 352″ wide for the world's newest and largest paper machines, Eastwood-Nealley Corp., Belleville, New Jersey, required a cylinder over 30 feet long.

Sandusky supplied this 44,685 lb. roll, centrifugally cast of SAE-1030 steel and rough machined to 363″ in length, 40⅝″ on the O.D., to be used as the backbeam on Eastwood's new wire cloth loom. Since the cylinder had to be machined with 176 extremely smooth 2″ x 2″ stirs (grooves) in which wire is wound, it had to be of *flawless quality*. Otherwise any voids or inclusions exposed by machining would nick the delicate bronze strands and cause the expensive wire cloth to fail.

Eastwood-Nealley's chief engineer, Clemson A. Bower, asserts: *"We chose a Sandusky Centrifugal Casting because only Sandusky could make such a gigantic cylinder without welding. We were confident that our special machining operation would be accomplished without costly re-makes, for in the 12 years we have been using them, we never found a single flaw in a Sandusky Centrifugal Casting!"*

When cylinders or piping are needed in your design, keep Sandusky Centrifugal Castings in mind. We can supply cylindrical products from 7″ to 54″ O.D. and up to 33 feet long—made from a variety of alloys including stainless, carbon and low-alloy steels as well as copper- and nickel-base alloys. Send for free booklet, "Your Solution to Cylindrical Problems."

SANDUSKY CENTRIFUGAL CASTINGS
FOUNDRY & MACHINE CO.

9804

SANDUSKY, OHIO Stainless, Carbon, Low-Alloy Steels—Full Range Copper-Base, Nickel-Base Alloys

For high speed equipment, specify new Clemson Star *High Speed* Band Saw Blades. They withstand temperatures generated by heavy duty sawing ... up to 1100°F ... and will cut quickly and easily through tough, steels and rugged alloys. And they're built to last.

For standard equipment, specify new Clemson Star *Duraband* Heavy Duty Blades. Made of a new type, long-life, alloy steel, they feature excellent heat and abrasion resistance ... make possible increased feed and speed rates of *standard* equipment ... extend the range and types of materials that this equipment can be used to cut. Their increased life-span significantly lowers your production costs, too.

Both these new Clemson Star Bands are cut and welded to your *exact* specifications ... and shipped in clearly marked containers that tell you their contents at a glance.

Where do you get them? At your Clemson Star authorized distributor ... the same place you get standard Clemson Star Band Saw Blades in the revolutionary Reel-Pac dispenser. Call him today. He's your best source for all your metal cutting tool needs.

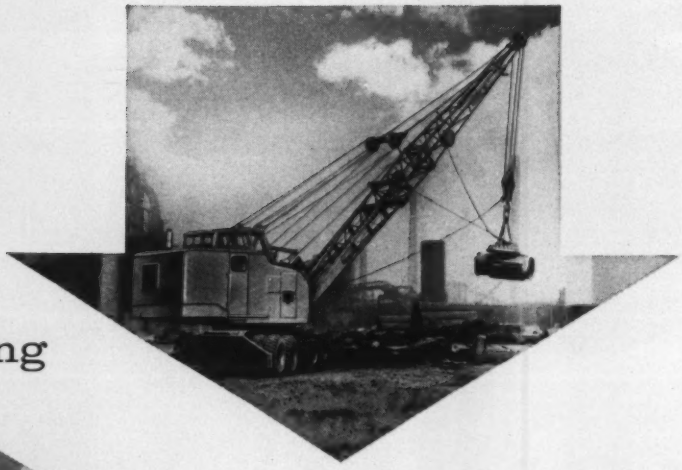
CLEMSON STAR

CLEMSON BROS., INC. • Middletown, N. Y.

METAL CUTTING PRODUCTS

POWER HACK SAW BLADES • HAND HACK SAW BLADES • HACK SAW FRAMES
BAND SAW BLADES • HOLE SAWS • FILES • CLEMSON HAND MOWERS

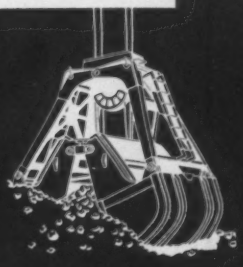
2348



for economically lowering

raising

and moving heavy bulk material



Industrial Brownhoist
cranes and bridges

write for catalog 562

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INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN

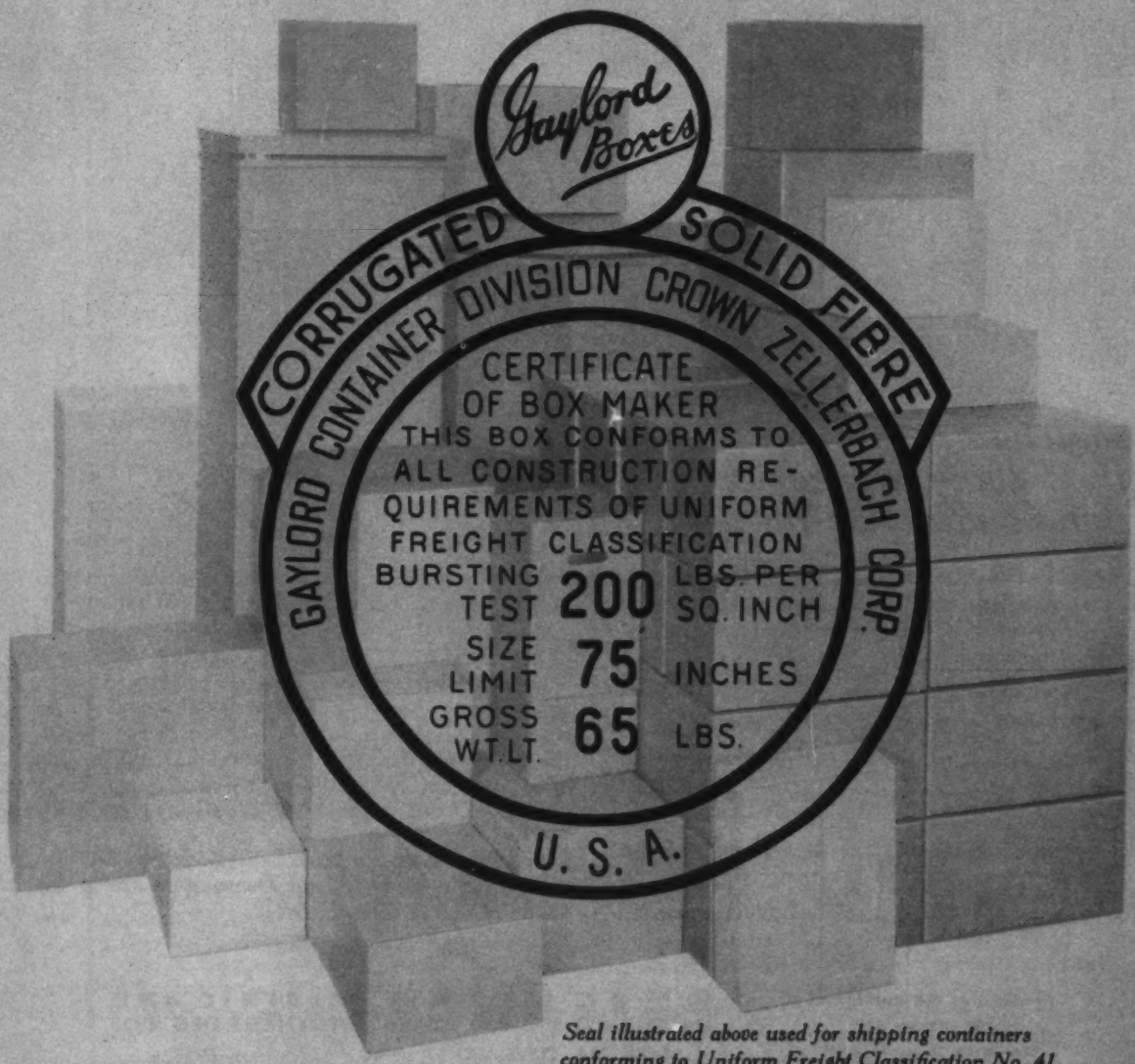
This is only one proof of GAYLORD *quality*

Here you read the measurable qualities in Gaylord Containers.

But how do you measure experience and ingenuity . . . which are *extra* qualities built into every Gaylord box?

Gaylord is part of a completely-integrated, nation-wide organization of packaging talents, devoted to delivering the most efficient, most economical container you can buy.

Your nearby Gaylord Man can prove this. Why not let him try?



Seal illustrated above used for shipping containers conforming to Uniform Freight Classification No. 41.

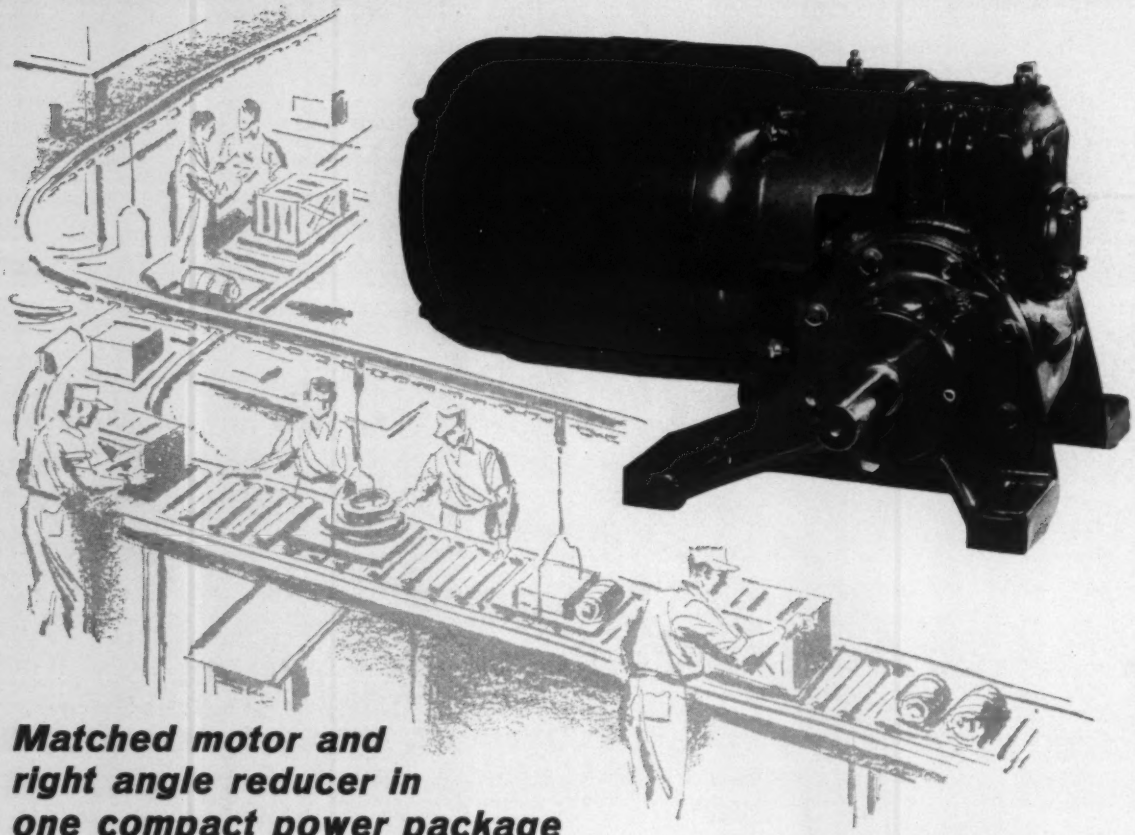
CROWN ZELLERBACH CORPORATION
GAYLORD CONTAINER DIVISION

IN CANADA - CROWN ZELLERBACH CANADA, LTD. VANCOUVER, B. C.

HEADQUARTERS, ST. LOUIS
PLANTS COAST TO COAST

MASTER GEARMOTORS

simplify applications—save space



Matched motor and right angle reducer in <u>one</u> compact power package

Reduction of engineering and assembly cost . . . elimination of separate components . . . are basic in this Master Right Angle Gearmotor. Consider these specific advantages:

1. No high speed coupling.
2. No V-belts or chains and sprockets.
3. Takes up less space—reduces mounting plates.
4. Special flange or face mounting can eliminate low speed coupling.
5. Saves aisle space . . . drives around the corner.
6. Wide acceptance by machine builder and user.

Master Gearmotors are built with ratings from ⅛ to 125 h.p. . . . in right angle, parallel or in combination. Right angle ratios are available to 96:1; parallel 120:1.

Electrical and mechanical modifications give you a maximum choice—vertical, horizontal, and flange mountings; output shaft over, under, left or right. These gearmotors can be supplied with built-in accessories: a fluid coupling for hard-to-start loads or cycling loads; a brake for fast stops and positive holding.

Call your nearest Reliance Sales Engineer. Let him tell you why more Master Gearmotors are in use today than any other make.

E-1643

Product of the combined resources of Reliance Electric and Engineering Company and its Master and Reeves Divisions

RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 44A, CLEVELAND 17, OHIO

Canadian Division: Toronto, Ontario
Sales Offices and Distributors in Principal Cities

Duty Master A-c. Motors, Master Gearmotors, Reeves Drives, V★S Drives, Super 'T' D-c. Motors, Generators, Controls and Engineered Drive Systems.

STEEL QUALITY

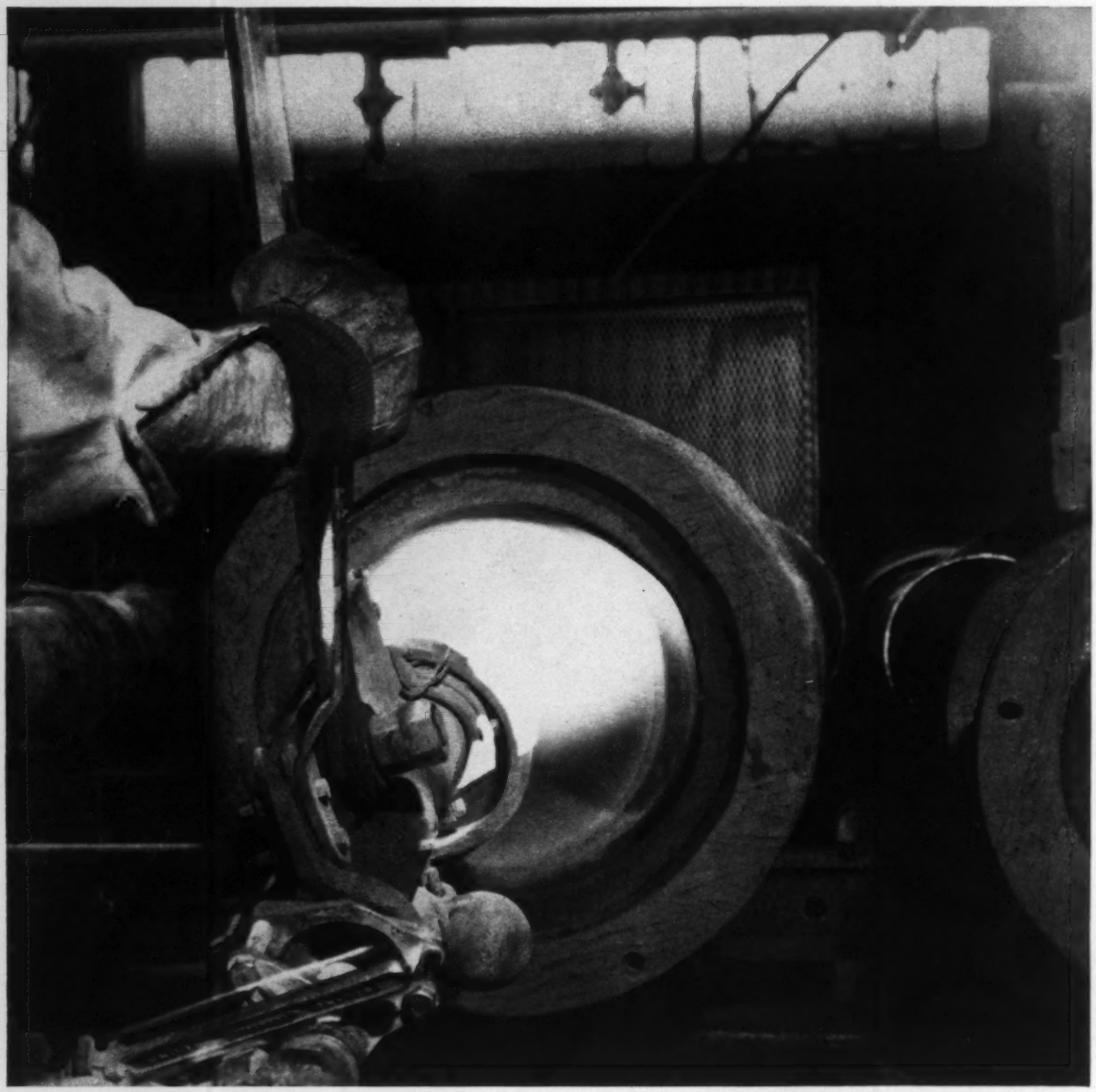
STEEL is a furnace, burning like the sun. It is a magic metal, born in fire. Steel serves you as no other low-cost metal can. It is everybody's metal. Steel. 2600 pounds of it in an average American car. 10,000 feet of it in an off-shore oil well. 2 pounds of it in a child's rugged toy. 16 inches of it in a handy, light tin can. Youngstown is carbon, alloy and Yoloy steel to cut, form, machine, stamp, weld or draw. Steel to build with, steel to use. From the furnaces of Youngstown, growing force in steel.

YOUNGSTOWN is steel plus quality. Physical quality that steel-eyed men in 39 Youngstown mills deliver. Chemical quality that specialists in metallurgy provide. Exacting quality that must meet the test of electronic devices. Cost-cutting quality that works with Youngstown service to help you design things better, to make things better. Youngstown steel is steel made for you, steel you can depend on. Quality steel. The kind you'd expect from modern and dynamic Youngstown, growing force in steel.

Youngstown – growing force in steel

THE YOUNGSTOWN SHEET AND TUBE COMPANY, YOUNGSTOWN, OHIO. ATLANTA BOSTON BUFFALO CHICAGO CINCINNATI CLEVELAND COLUMBUS DALLAS DENVER DES MOINES DETROIT GRAND RAPIDS HOUSTON INDIANAPOLIS KANSAS CITY LOS ANGELES MILWAUKEE MINNEAPOLIS NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH ST. LOUIS SAN FRANCISCO SEATTLE TULSA WASHINGTON

Intense heat from four Gas-fired torches skin dries pipe molds in as little as 2 minutes, after ramming and facing with a blacking material.



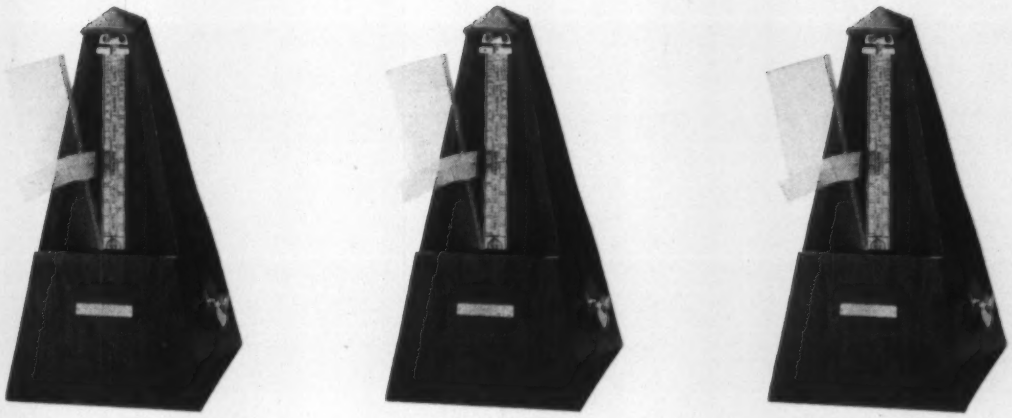
Only GAS provides the clean, uniform heat needed to skin dry pipe molds! Millions of BTU's of clean, uniform heat are required every hour by Warren Foundry & Pipe Division of Shahmoon Industries, Inc., Everett, Massachusetts, to skin dry its pipe molds.

Only Gas provides this volume of heat without any problems of shipping and storage. That's why Warren Foundry chose Gas to solve this large scale heating problem. And as plant engineer William Mitchell says, "We chose Gas over other fuels because of its cleanliness and uniformity of heat value."

For information on how Gas can help you with your production problems, call your Gas Company's Industrial Sales Engineer. He'll be glad to discuss with you the economies and outstanding results you get with the clean, uniform heat of Gas, and modern Gas-fired industrial equipment. AMERICAN GAS ASSOCIATION

FOR CONTROLLED INDUSTRIAL HEATING

...GAS IS GOOD BUSINESS!



POSITIVE DUPLICATION—EVERY TIME!

With these three metronomes—or with a thousand—the time interval you choose can be positively duplicated time after time after time. And with these three PD° surface wheels—as with *all* CINCINNATI PD GRINDING WHEELS—you'll get the same kind of Positive Duplication *every time*!

HERE'S WHY . . . IN 36 STEPS

There are 36 unvarying quality control steps in Cincinnati's unique PD manufacturing process. Right from the start with the choice of the "grains" that go into a wheel, PD procedures involve exacting checks and re-checks. Every grain characteristic—from size, cleanliness, absence of foreign matter, color, magnetic content, to bulk density before and after blending—must fully satisfy extraordinary PD specifications, which are followed throughout in all 36 rigid controls.

RESULT: PREDICTABLE PERFORMANCE

You can depend on the uniformity of PD WHEELS—for each reorder wheel gives you exactly the same good job as the original. Production goes up and stays up. Costs go down and stay down. This is the promise—and performance—of Positive Duplication.

CALL CINCINNATI TODAY

Solve your grinding problems with the help of our Cincinnati-trained specialists. Their wide experience in job set-ups and grinding operations is at your service. Just call your CINCINNATI PD GRINDING WHEEL Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

PD POSITIVE DUPLICATION

CINCINNATI®
GRINDING WHEELS

°Trade Mark Reg. U. S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

NS SPECIAL WIRE KEEPS SPRINGS ALIVE IN 1400° BATH

When a leading manufacturer of microwave assemblies and radar components was faced with a serious production bottleneck in a high-temperature dip-brazing operation, they came to National-Standard for help in solving the problem.

CRITICAL MICROWAVE ASSEMBLIES being brazed in a 1400° salt bath were held together by cumbersome weights and intricate fixtures that frequently caused distortion or slippage during the brazing operation. The solution—and a considerable time and money saver—was to clamp all the components with springs that would allow expansion of the various parts during brazing without distorting the assembly. However, conventional spring wire would not retain tension at 1400°. Once used, springs had to be discarded.

NATIONAL-STANDARD ENGINEERS, working with the manufacturer's engineers, tested a new superalloy spring wire, NS-25 (L605), that proved "as good as new" after several hundred brazing operations at 1400° F. The mechanical stability of NS-25 spring wire insures proper expansion of parts during heating and maintains just the right tension to give mating parts good contact and perfect bond. The result is manufacturing that is simplified, faster and more precise than was previously possible.

EXPERIENCED ENGINEERING HELP of this kind, for jobs requiring high-quality wire, to meet special or unique applications, is available to you from National-Standard. Write for additional information to National-Standard Company, Niles, Michigan.

MICROWAVE ASSEMBLIES are held together in 1400° brazing bath by springs made of NS-25 wire. This special alloy wire allows rapid, precise brazing never before possible.

NS NATIONAL-STANDARD COMPANY

Manufacturer of Specialty Wire and Metal Products

NATIONAL-STANDARD COMPANY

Niles, Michigan

Your most valuable dollars may be life insurance dollars

The dollar value of your estate is not only important to you *now* but to your family in the *future.* Failure to make proper provisions beforehand is costly. The unavoidable expense of taxes, debts, administration and legal fees can shrink the value of an estate by a third or more – money paid to strangers rather than heirs!

But an Ætna Life Estate Conservation Plan pinpoints ways to cut tax liability and settlement costs to the minimum. Then it provides adequate cash to cover the unavoidable costs . . . *valuable dollars* that guarantee your heirs all that you intend them to have.

An Ætna Life representative, working through your attorney, will gladly review your present arrangements – or establish a plan if you have none – without obligation through your Ætna Life office.

Ætna Life's Estate Analysis works for you and your family

- **Minimizes tax liability**
- **Provides money to pay transfer costs**
- **Assures orderly transfer to heirs**
- **Protects against forced sale or borrowing against estate assets**

ÆTNA LIFE
INSURANCE COMPANY
Hartford 15, Connecticut

Affiliates: Ætna Casualty and Surety Company
Standard Fire Insurance Company

The alternate to this is . . . DOWNTIME!

An ounce of prevention . . . can eliminate *downtime* in your plant. With today's highly mechanized manufacturing and distribution methods . . . *downtime* of materials handling equipment can mean the difference between a profit or a loss.

A Clark Dealer *Continuous* Maintenance Program, available from 113 Clark dealers across the continent, offers you the most effective, and economical method of reducing costly *downtime*. Here's why!

In brief, a Clark Dealer Continuous Maintenance Program offers you:

1) . . . regular maintenance on your industrial trucks on a *programmed* basis. Scheduling is conveniently set up for your particular operation. If you like, service to your equipment can be done at night or at any other time when your equipment is not in use. The additional cost for this off-shift service is a small percentage of the cost of *downtime*.

2) Clark dealers, with the aid of a national service personnel training program, assure you that the best trained mechanics in the industry will service your equipment. These highly trained specialists perform a minimum of 22 separate inspections on every truck serviced. They not only perform the normal jobs of greasing and oil changes, but also make all necessary adjustments to your equipment. Most important, they report the condition of your machines, anticipating failure before it happens. As a result . . . *downtime* is drastically reduced.

3) A Clark Dealer Continuous Maintenance Program gets you out of the repair and maintenance business. It eliminates the need for special tools, parts stock and use of valuable plant space for servicing facilities.

4) A Clark Dealer Continuous Maintenance Program is economical. It actually costs less than similar service on your own automobile. This is an inadequate comparison, however, when you consider the small cost of preventive type maintenance to the cost of *downtime*.

For detailed information on a Clark C.M. program call your local Clark dealer (he's listed in the Yellow pages) or write: C.M. Service, Clark Equipment Company, Battle Creek, Michigan. No obligation, of course.

CLARK® EQUIPMENT

Printed in U. S. A.

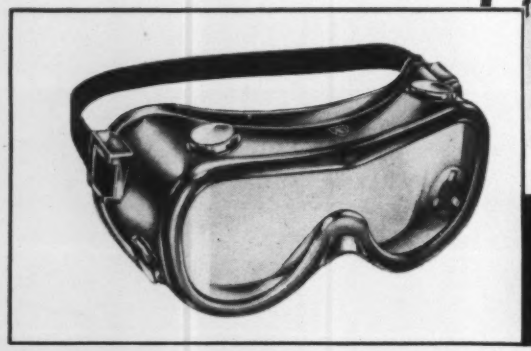
Allied Chemical Corporation* Cuts Eye Accidents 85%
Saves Eyes, Lowers Costs with AO Protection Program

(*Plastics and Coal Chemicals Division, Frankford Plant, Philadelphia, Penna.)

When a company or plant can cut reportable eye injuries by 85% in 10 years (1948-1958) it wins in many ways. Because eye injuries average $432 in cost for compensation alone (Source: National Safety Council), a company lowers operating costs significantly. Annual savings well up in five figures are common. Add to these the savings in first aid, hospital and medical care and in the "hidden costs"** which are considerable.

What's the cost of protection? $2.65 is the average price of safety glasses. Put them on 1,000 production workers, for example for $2,650. Prevent just 10 eye accidents (savings in compensation *alone*, $4,320). *Net* savings, $1,670. An AO Eye Protection Program featuring the right safety standard frames and lenses for man and job is an investment with built-in savings. Write for new booklet, "Eyes Are Expensive Targets."

**Idle equipment charges, lowered production quality, increased spoilage, etc.

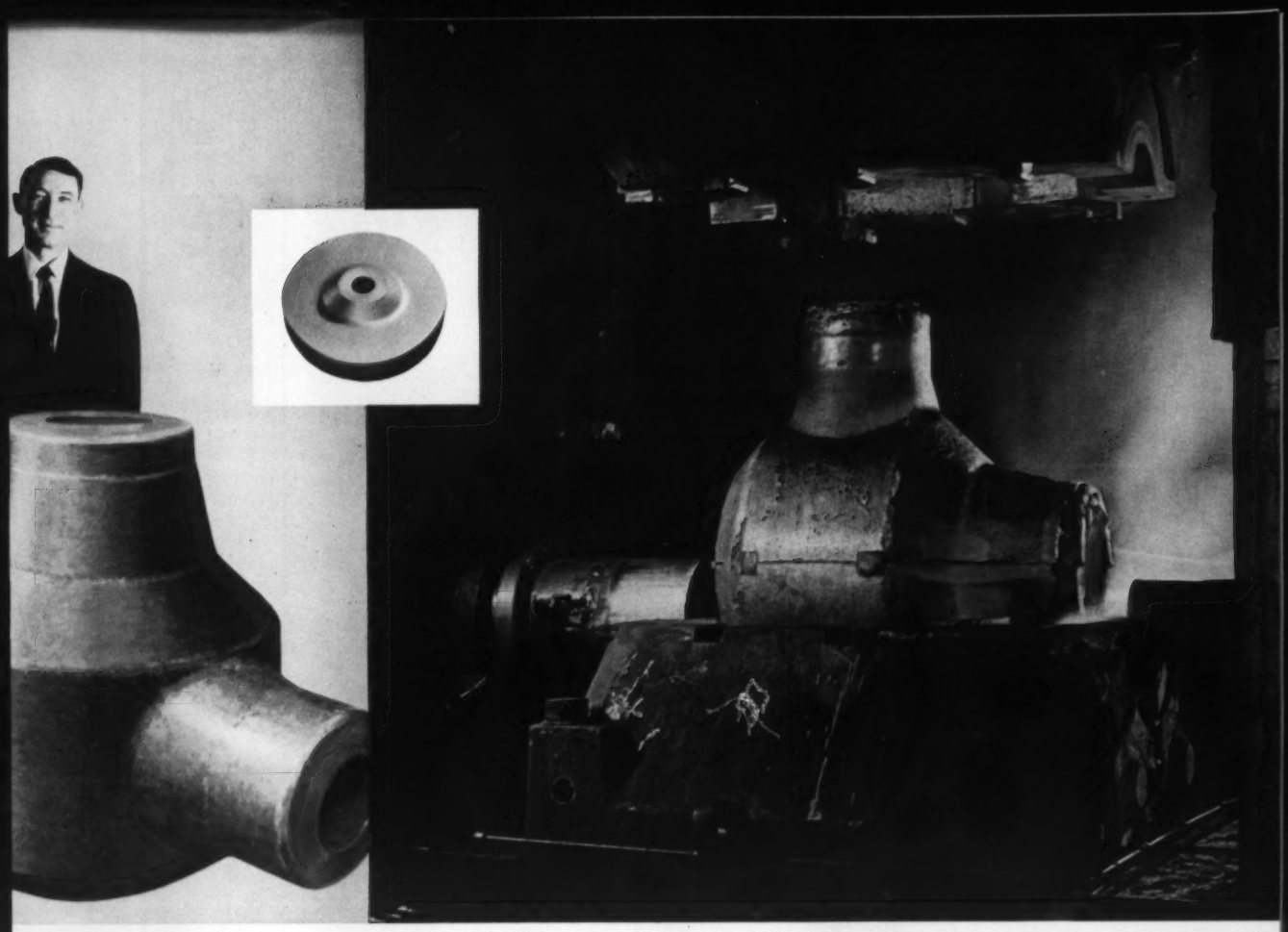


Always insist on AO Trademarked Safety Products

American Optical Company
SAFETY PRODUCTS DIVISION
SOUTHBRIDGE, MASSACHUSETTS

Safety Service Centers in Principal Cities

Be Safe For Sure — With AO SURE-GUARD Products



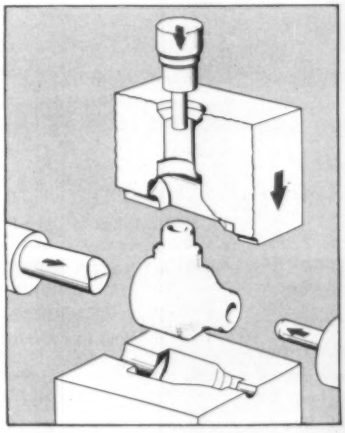
CAMERON FORGINGS

New properties – new quality for new design demands.

Cameron split die ferrous forgings have now been produced for more than a decade – a very short span in the ancient art of metal forming, but just in time to fulfill and stimulate new demands in an age which has made the greatest demands in the history of metallurgy. Our processes and forgings have no exact counterpart in previous forging practice. The 13,000 pound throttle valve body of chrome moly material, photographed above as it emerges from its split die in one of our side ram presses, is a typical Cameron solution to a recent problem, requiring large size, unusual shape and top quality.

The inset photograph gives an idea of our range in size and shape while producing the same superior properties. This jet engine turbine wheel, A-286 material, weighs about 13 pounds, but is one of today's most demanding applications for a precision member.

Large or small, our forgings possess unusual metallurgical properties because:



1. Cameron techniques allow intricate shapes to be forged in one heat, yielding uniformly high properties from center to surface and uniform fine grain size.

2. The movement of metal under high internal pressure increases the transverse ductility properties several times above normally expected values.

3. The internal working of the metal breaks up segregated material inherent in the center of steel and high density alloys and yields forgings that consistently meet high ultra-sonic standards.

4. The totally enclosed method of forging avoids flash line magnetic indications and the localizing effect of the flash grain on transverse, fatigue, and stress rupture properties.

If you specify or purchase ferrous high density alloy or refractory forgings and would like more information about our facilities, write, call or come by . . .

Cameron

IRON WORKS, INC.

SPECIAL PRODUCTS DIVISION
P. O. Box 1212, Houston 1, Texas

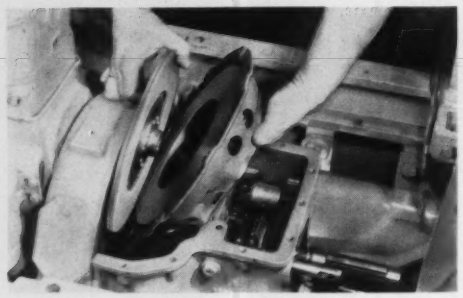
There's a dollar-saving difference in Allis-Chalmers Lift Trucks

Ask any mechanic who has serviced them all

Ask him how long it takes to prepare an Allis-Chalmers truck for routine servicing.

He can show you almost as fast as he can tell you — it takes only seconds.

Ask him how much time you save on clutch replacement.



You'll find he can change the clutch in half an hour.

Ask him how often he overhauls the Allis-Chalmers engine.

Unless he is an old-timer, he could still be waiting to overhaul his first one. Many users find Allis-Chalmers engines go 10,000 hours or more before overhaul.

Naturally, these are just a few of many examples, but even these add up to many dollars' worth of difference. Let your Allis-Chalmers dealer tell you about others — then watch an Allis-Chalmers lift truck in action. He'll be glad to arrange a demonstration . . . you'll be glad he did. Allis-Chalmers, Milwaukee 1, Wisconsin.

"A lift truck has to keep moving or you lose money — and ours keep moving" — that's the way a spokesman for Vendo Manufacturing Co. characterizes their experience with a fleet of Allis-Chalmers lift trucks. "Our maintenance costs are low. That Allis-Chalmers engine is wonderful. It is easily overhauled and has a world of power."

BH-127A

ALLIS-CHALMERS

General Electric, as developer and user of many heat processes, has the know-how to reduce your costs and improve your product quality.

HEAT
from General Electric

How General Electric heat process know-how can cut your costs, improve product quality

There's only one correct starting point in manufacturing an industrial furnace—process know-how. By building on our knowledge of your particular heat processing problems, General Electric is able to develop the most economical heating method for quality results on your line.

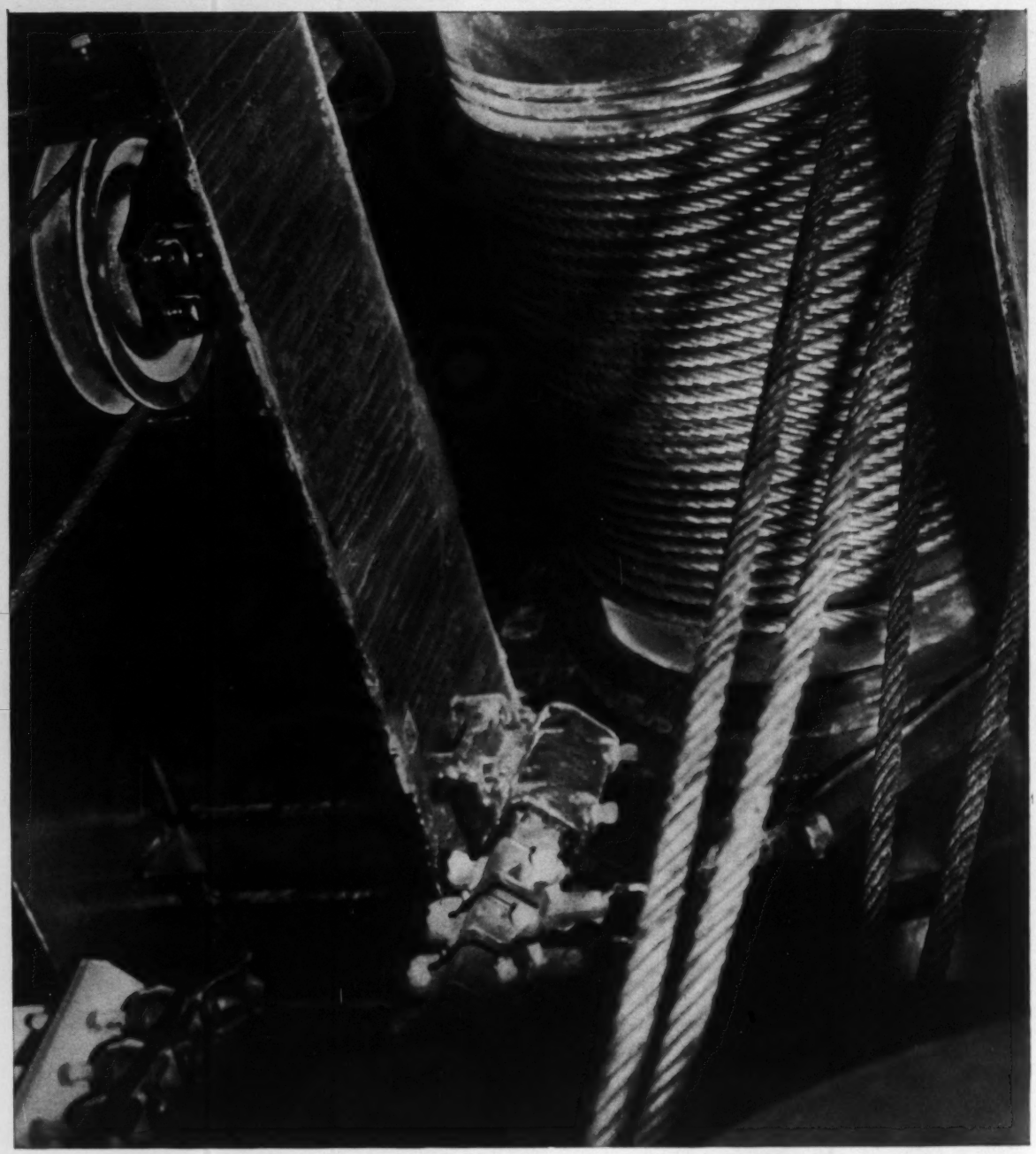
Example: A commercial heat treater now saves nearly 50 percent of his raw material costs while maintaining quality specifications. General Electric understood the product requirements, and developed a heat treatment which permitted substitution of common iron for silicon steel.

Example: Shorter production cycle and reduced cost resulted when pickling was eliminated in one manufacturer's process. Bright annealing of stainless steel parts in a General Electric mesh-belt, semi-continuous muffle-less furnace produced bright, shiny parts of high quality.

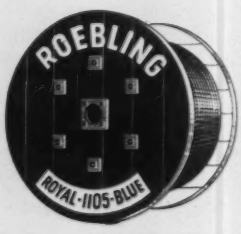
Ask your nearby General Electric Apparatus Sales Office to analyze your heating process requirements. A G-E heating specialist will provide you with the "added value" service that can improve your product and save you money for years to come.

721-31

GENERAL ELECTRIC



IF THE WIRE ROPE YOU'RE USING HASN'T GOT IT HERE...IT HASN'T GOT IT

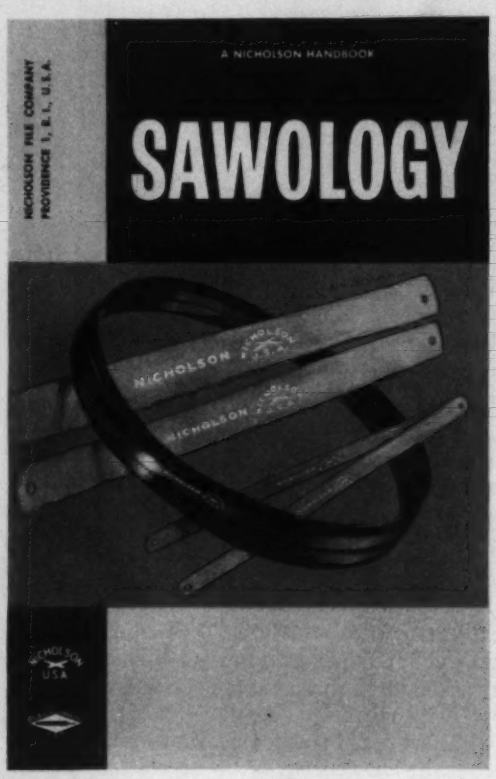


This rope has it—and has it at every critical point of wear for these reasons:
Extra Resistance to Bending Fatigue · Extra High Strength
Good Flexibility and Excellent Resistance to · Shock · Abrasion · Impact · Crushing
For anything you want to know about Roebling Royal Blue Wire Rope, ask your Distributor or Roebling's Wire Rope Division, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities *John A. Roebling's Sons Division · The Colorado Fuel and Iron Corporation*

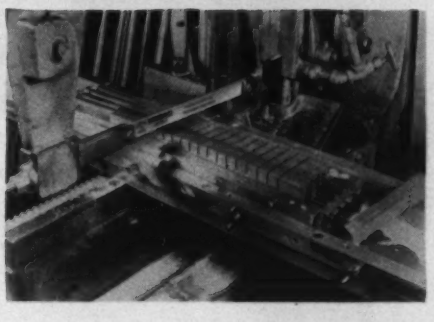
FREE! FROM NICHOLSON—34-PAGE HANDBOOK ON METAL-CUTTING SAWS. SEND FOR YOUR COPY TODAY!



Material	Teeth Per In.	Strokes Per Min.
FERROUS		
Drill Rod	10	90
Forging Stock, Alloy	4-6	90
Forging Stock, Mild	3-4-6	120
Iron, Cast	6-10	90-120
Iron, Malleable	6-10	90
Rails	6-10	60-90
Steel, Alloy	4-6	60-90
Steel, Carbon Tool	4-6	90-120
Steel, High Speed	6-10	60-90
Steel, Machinery	3-4-6	90-120
Steel, Stainless	3-4-6	60-90
Steel, Structural	6-10	90-120
Steel, Die Blocks	4-6	60-90
Steel Pipe	6-10	120
Tubing, Thick Wall	6-10	120
Tubing, Thin Wall	14	120
NON-FERROUS		
Aluminum	3-4-6	120
Babbitt	4-6	120
Brass Castings, Hard	4-6	90-120
Brass Castings, Soft	4-6	120
Bronze Castings	4-6-10	90
Bronze, Manganese	6-10	60-90
Copper Bars	3-4-6	90
Copper Tubing	10	120
Monel Metal	4-6	60-90

This chart *(left)* has been developed as a helpful guide in selecting the best blade tooth and stroke speed for ferrous and nonferrous materials.

This picture *(below)* shows the use of a power blade holder extension, which for certain cutting jobs permits the use of a shorter blade in the machine . . . reducing cost.



Handy textbook manual contains complete and useful information for shop superintendent, production foreman, mechanic, machinist, maintenance man, purchasing agent, mechanical trainee . . . everyone connected with the management and operation of your shop, plant or industry.

HERE'S a book that can save you money. It's the first of its kind dealing with the manufacture, proper selection, effective use of saws for cutting ferrous and nonferrous metals, hard plastics and rubber, wood . . . other dense materials.

It was written especially for Nicholson and draws upon all our facilities, skills and experience with metal-separating jobs and appropriate tools.

Following is a partial listing of topics discussed: "How to get the most out of hand hacksaw blades," "Power hacksaw tooth selector," "Hints on the use and care of power hacksaw blades," "Band saw blade and tooth selector," "Friction sawing," "Contour sawing."

Pages are illustrated with numerous photographs and diagrams. Text is straightforward in easy-to-understand terms for *everyone* who deals with metal sawing.

"Sawology" has just been published and is now available. It is designed to help you make the most efficient and economical use of all metal-cutting blades. And it's available without cost to you. Just clip and mark the coupon.

* ***Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them.***

NICHOLSON

NICHOLSON FILE COMPANY, PROVIDENCE 1, RHODE ISLAND

FILES AND ROTARY BURS • HACKSAW AND BAND SAW BLADES
GROUND FLAT STOCK • INDUSTRIAL HAMMERS

Mark and mail this coupon today.

NICHOLSON FILE COMPANY, Providence 1, Rhode Island

Gentlemen: Please send me a free copy of your new book, "Sawology."

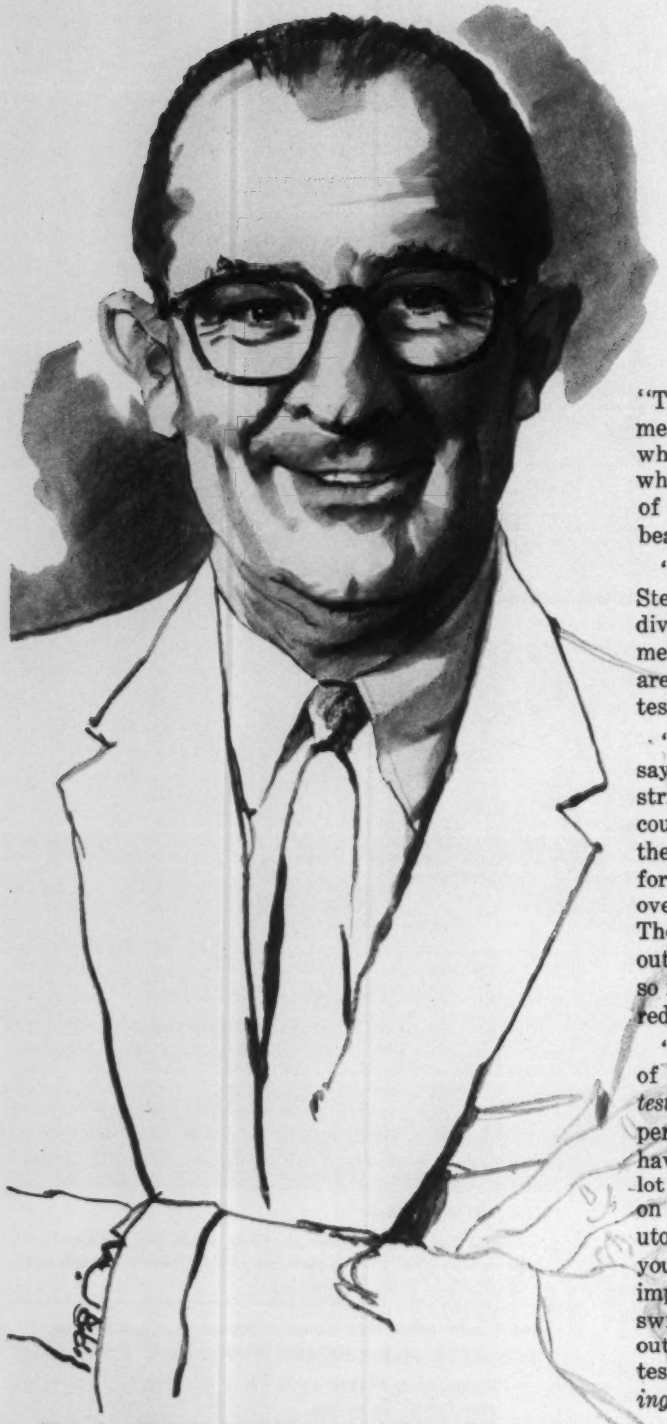
Name_____

Firm_____

Address_____

City_____ Zone____ State_____

"Even our standard stock wheel



Elden L. Auker, Vice President—Marketing of Bay State Abrasives, is a man who knows the industry through years of experience both in working in the field with Bay State customers and from close association with the research and development programs at Bay State's manufacturing headquarters in Westboro, Mass.

"There's only one thing in this business that gives me a bigger kick than seeing a new Bay State wheel specification turn out successfully. That's when one of our standard wheels goes into a series of tough tests and proves it has what it takes to beat the competition.

"That's what happened recently at Omaha Steel Works. They're one of the largest and most diversified processors of structural steel, weldments and steel castings in the entire Western area of the U.S. . . . and, believe me, they are test-minded.

"As our own Abrasive Specialist, Gene Miller, says: 'This was one time when sales talk was strictly *verboten*. They wanted the best wheel they could get for finish-grinding steel castings and they asked all the major abrasives manufacturers for wheels to test. And, did they give them a going over! There wasn't anything they didn't check. The results showed our stock specifiication beat out all wheels in cutting speed and length of life so it cut their cost-per-hour figures and naturally reduced down-time for wheel changes, too.'

"Well, there's one example. But there are plenty of others. And they all prove the importance of *testing* . . . even testing wheels that are doing a perfectly acceptable job . . . because we may well have a standard stock wheel that could do a whole lot *better* job. In your tool room, for example, or on the production line, put your Bay State distributor or our direct representative on the trail and you could quite possibly wind up with substantially improved performance and cost figures just by switching to a standard Bay State wheel, straight out of inventory. Our people will cooperate in any tests you want to set up because . . . *better grinding at lower cost . . . that is their business.*

beat out all competition at OMAHA STEEL WORKS"

(Right) Chief Inspector Lloyd Base and Bay State Abrasive Specialist Gene Miller examine results achieved with Bay State finish-grinding wheel.

(Below) Operator Vincent Munsinger finish-grinds steel track-carrier casting with Bay State's 6 x ¾ x ⅝ wheel on a portable air grinder. "This wheel cuts fast and I don't have to change wheels too often," says Munsinger.

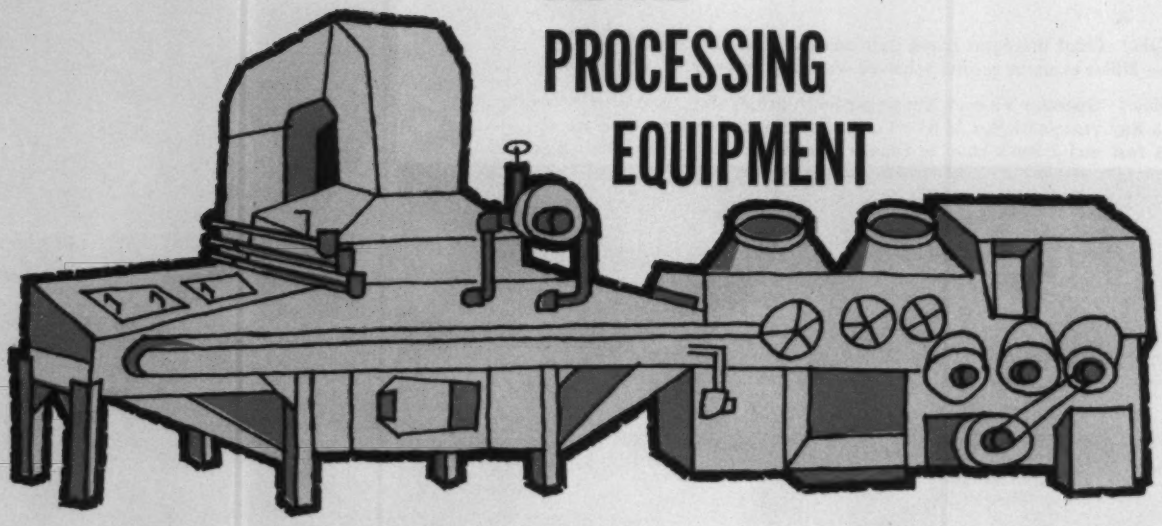
(Safety guard removed for photography)

BAY STATE ABRASIVES

BAY STATE
WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

why it pays to buy METAL PROCESSING EQUIPMENT



from a company that makes METAL PROCESSING CHEMICALS

Getting full return on every dollar you invest in your metal finishing line depends on your equipment and chemicals working together *as a team.*

This teamwork is just what Pennsalt's *System Approach* makes sure you get. It assures you of equipment engineered to get the most mileage out of modern, specialized chemicals . . . and chemicals that give consistent, specification-meeting performance in the equipment.

Because we supply a complete line of both chemicals and equipment, we have the specialized know-how to treat your metal finishing line as an integrated system. Our nation-wide service organization assures you of continued top performance of your finishing process . . . through personal assistance in installation and start-up, and through periodic service calls. To find out how this approach can work for you, write for Booklet 306.

Pennsalt Metal Finishing Equipment
Washers of all types
Automatic coating machines
Automatic phosphatizing machines
Automatic pickling machines
Drying and finish bake ovens
Paint spray booths
Special equipment
Complete finishing systems

Pennsalt Metal Processing Materials
Cleaners for all metals
Etchants and brighteners
Descaling and pickling compounds
FOSBOND® phosphating agents
FOSCOAT® pre-lubricant coatings
FOSLUBE® drawing lubricants
DRAWCOTE® deep-drawing lubricants
Paint strippers and strippable vinyl coatings

. . . a better start for your finish®

METAL PROCESSING DEPARTMENT
PENNSALT CHEMICALS CORPORATION
East: 3 Penn Center, Philadelphia 2, Pa.
West: 2700 S. Eastern Ave., Los Angeles 22, Calif.

Pennsalt Chemicals®
ESTABLISHED 1850

SEE YOUR WORK WHILE YOU WORK

The First and Only SEE-THRU GRINDING DISC

Here is an in-action photo of the new VIZI-DISC. *See how the operator can "look through" the work area of the disc.*

VIZI•DISC

it's the METALITE

Outstanding new benefits for metalworking

These METALITE VIZI-DISCS let you "see through" . . . to the exact area where work is being done. Grinding action is intermittent, and the disc cools itself as it runs. The unique shape of the VIZI-DISC gives it "see-through" like a fan blade or an airplane propeller.

This minimizes the danger of burning work. VIZI-PADS (back-up) guarantee an aggressive rate-of-cut and longest disc life.

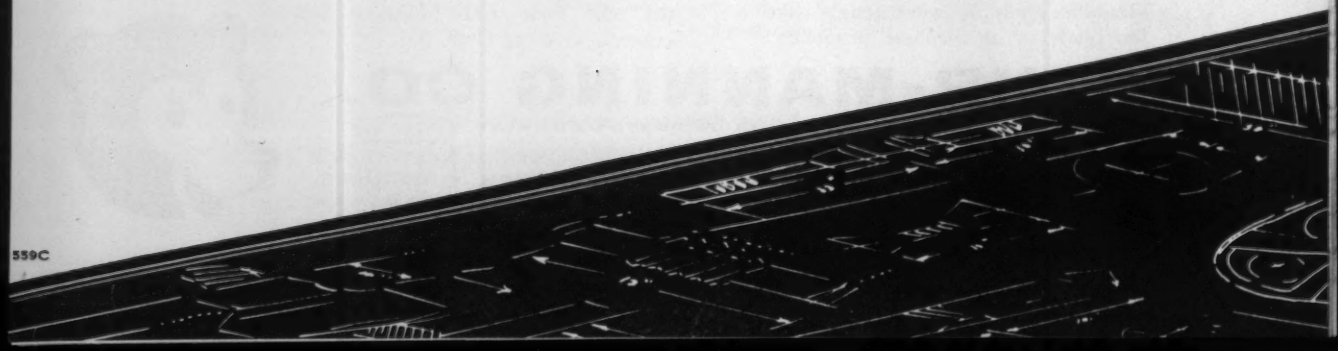
You can get a free demonstration . . . just call your Behr-Manning representative or write Dept. S-4.

BEHR-MANNING CO.

TROY, NEW YORK – A DIVISION OF NORTON COMPANY NORTON

BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes • Floor Maintenance Products
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals
In Canada: Behr-Manning (Canada) Ltd., Brantford. • For Export: Norton International Inc., Troy, New York, U. S. A.

Seven out of ten successful threading operations require engineering



539C

Recent Landis sales figures show that 7 out of 10 successful Threading Operations require some Engineering to assure the utmost in Threading efficiency. "Threading Equipment by Landis" includes Engineering Service geared to offer help with any Threading Operation. This Engineering Service is the best available. Backed by the resources of the World's Largest Manufacturer of Threading Equipment, our Engineering Department is able to handle every type of Technological requirement.

For example, a LANDIS 32AX LANDMATIC Heat Treated Die Head was recently engineered for application to a No. 1AC Warner and Swasey automatic chucking machine to produce two different thread diameters simultaneously in one pass on a single workpiece. This two diameter threading greatly reduced threading and material handling time.

Plants everywhere benefit from the knowledge our Engineering Department applies to every threading operation. Advice on thread design, the proper threading method to use, the proper threading equipment to use, and the development of special tooling, fixtures, or equipment for unusual operations are among the services offered. Engineering Service can also mean much to you in the solution of your daily Threading Problems—whether in Cutting, Rolling, Tapping or Grinding.

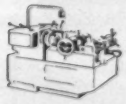
MMT-PE

BOOTH NO. 432

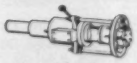
LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA

THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

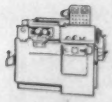


Threading Machines



Taps—Collapsible & Solid Adjustable

Centerless Thread Grinding Machines



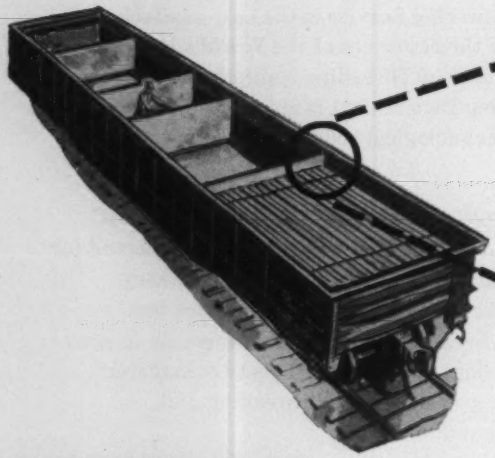
Thread Rolling Machines

Die Heads—Rotary & Stationary

Thread Rolling Tools

How "RoLLoK" Movable Bulkheads Solve Shipping Problems . . .

FOR SHIPPERS



COPPERWELD STEEL COMPANY, WARREN, OHIO, MANUFACTURERS OF ARISTOLOY, THE ARISTOCRAT OF ALLOY STEELS, REPORTS:

"Yocar movable bulkheads save us up to 1800 pounds of dunnage and 6 man-hours per car. They require a minimum of effort to position and lock for shipping. To date all loads have arrived without damage claim." Copperweld is just one of many shippers saving time and money with Yocar safe shipping devices.

No matter what **your** product or shipping problem, Yocar can help solve it. Give us a call.

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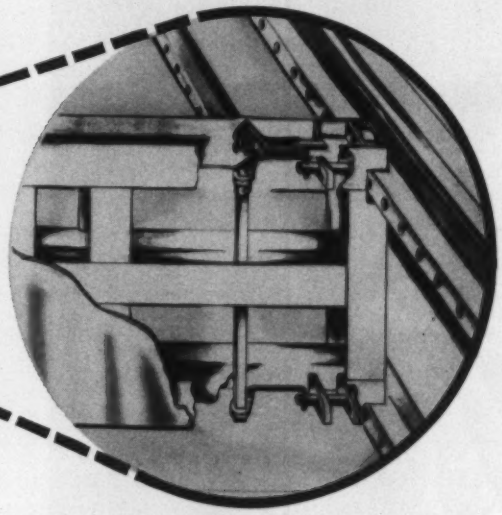
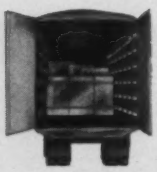


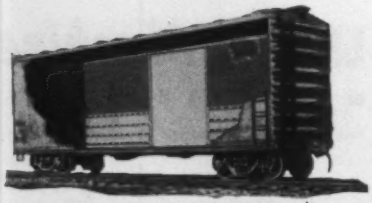
7 YOCAR EXCLUSIVES:

- "ZEE" TRACKS . . . Cut installation time in half over double angle construction.
- OVERSIZED CASE-HARDENED LOCKING PINS . . . Easy operating, allows for distortion of side walls.
- ROLLER SUSPENSION . . . Case-hardened rollers allow fast, effortless positioning.
- FOUR PER CAR SET . . . Meets AISI Traffic Committee's recommendation for 48" high car walls.
- POWERFULLY BOLSTERED . . . by five 6" "I" beams . . . built to last.
- PERFECT COMPANION . . . for Yocar 3-section roofs.
- TWO FACINGS available . . . no extra cost . . . choose ¼" steel or wood.

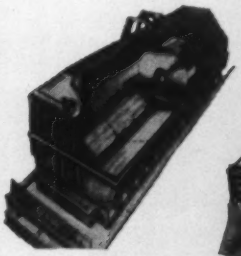
YOCAR MAKES A COMPLETE LINE OF DAMAGE CONTROL DEVICES



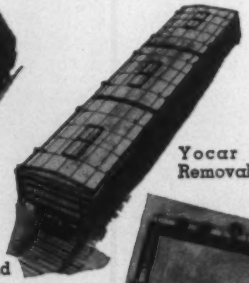
Safe-Cargo Anchor Rails for piggy-back trailers.



Yocar Safe-Cargo Econo-Guard —increases car wall life.



Shock-Spring Coil Skids and protective hood with seam-lock and corner strength.



Yocar 3-Section Removable Roofs.

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LOW-COST POSITIVE DAMAGE-CONTROL

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YOUNGSTOWN STEEL CAR CORP.
NILES, OHIO

OR HOW TO DEGREASE MORE PARTS PER DOLLAR OF CLEANING COST

X marks the spot where this company's vapor-degreasing troubles began to pile up. Parts coming out of the degreaser should have been shiny, bright. But they weren't.

Clue: There was a fatal weakness in the solvent. It was stabilized—but it didn't have the staying power to take rack after rack of parts loaded with acid cutting oil. Few solvents do.

PSP TO THE RESCUE Now this company buys a degreasing solvent that does not wear out prematurely. A solvent that can't "go sour" without notice and start staining parts instead of cleaning them. A solvent that cuts degreasing cost, because it lengthens the time between degreaser cleanouts by weeks or even months.

You can get this degreasing solvent, too. Just ask for Nialk TRICHLOR. You don't have to worry about its stability. You don't have to add fresh stabilizer. Even the vapor in the bath is stabilized. And you use less of this solvent, because less goes down the drain in needless cleanouts.

For more facts on what you can save with this better, more stable trichlorethylene, give your Nialk TRICHLOR distributor a call. Today.

NEW 36-PAGE BULLETIN explains fully how you get more and better vapor degreasing for the money with Nialk TRICHLOR. Shows basic types of vapor degreasers. Discusses cycles, operating procedures, stabilizers, causes of solvent contamination, solvent recovery, trouble shooting. Ask your distributor for a copy or write us.

Nialk® Trichlor, a product of

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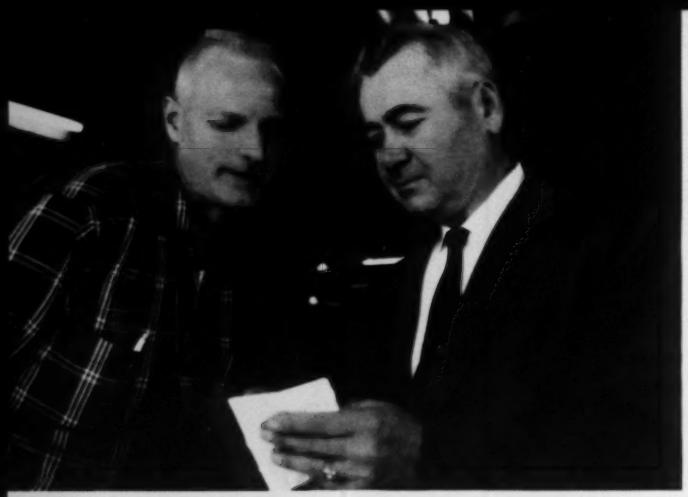
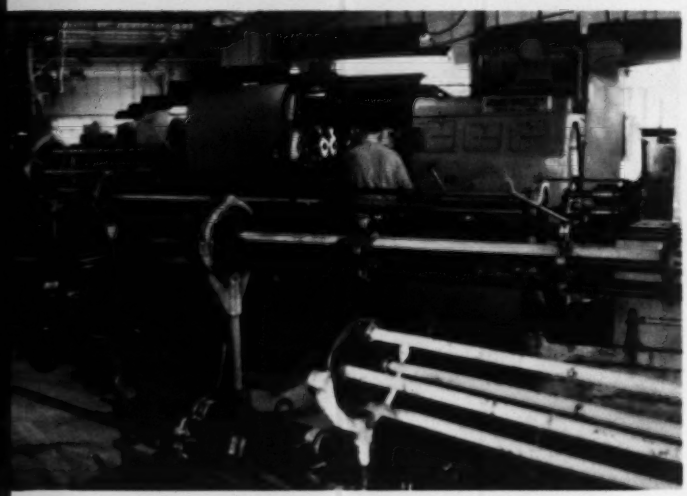
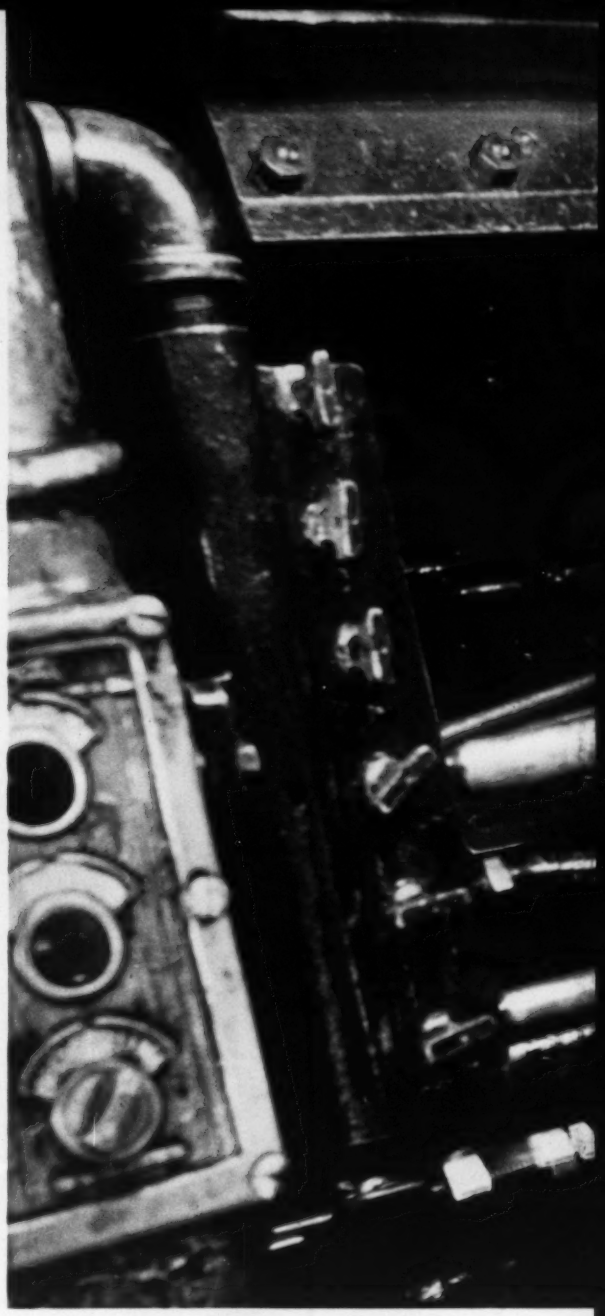


Irving Hunt, left, Secretary of Holt Products Company, and H. F. ("Herm") Johnson, Gulf Sales Engineer, discuss savings resulting from use of Gulfcut 31C.



Section of the modern automatic screw machine department at Holt Products Company, Holt, Michigan. Machining small precision parts, Holt gets superior results with Gulfcut 31C.

Job pictured here: cutting spacer blocks for plow manufacturer. Material: 1⅛" bar stock steel. Tolerances: ±.0005". Feed: .0006 ipr. Production: 340 spacer blocks per hour. Tool grinding required only once a shift. Finish: excellent.



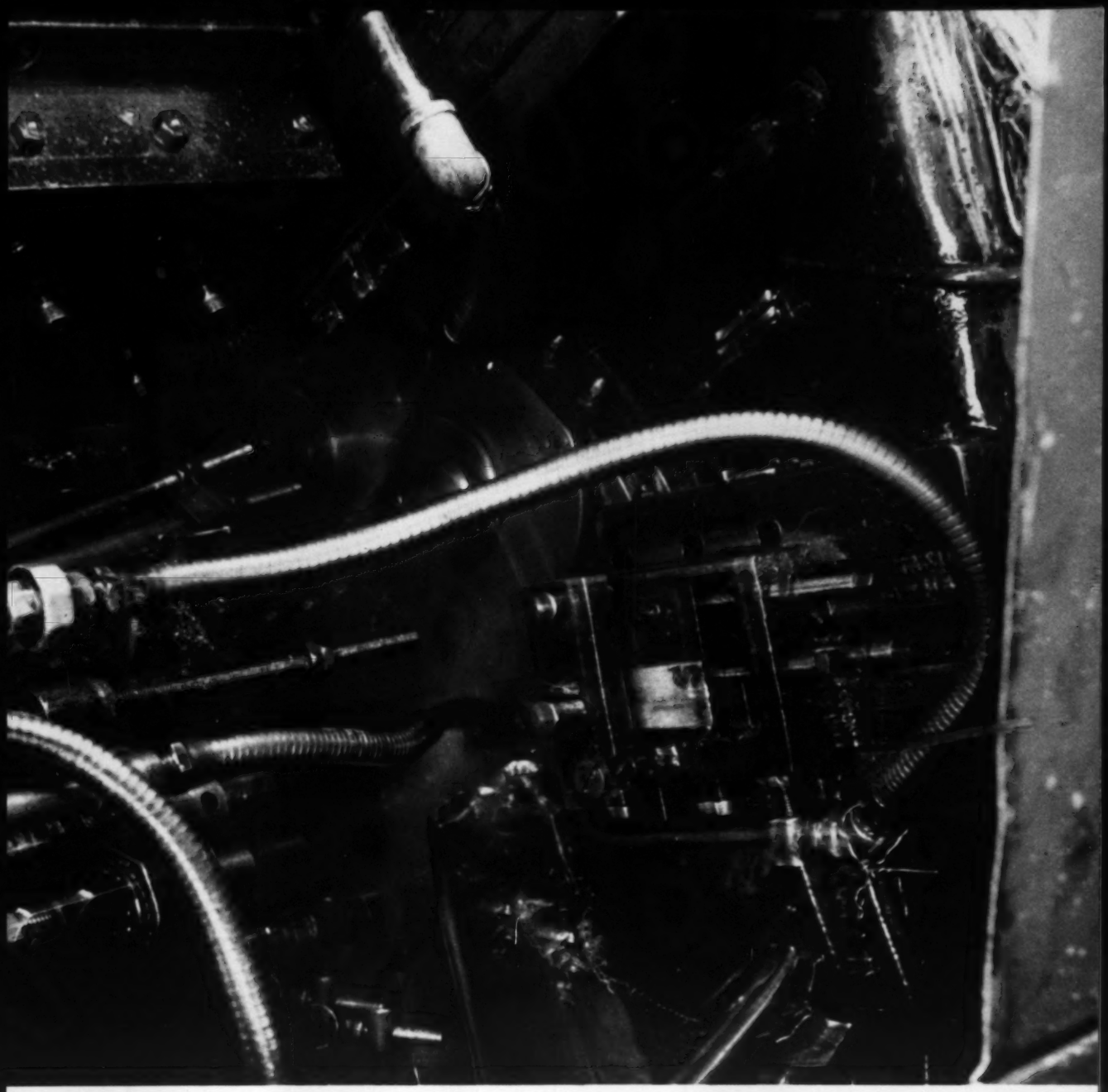
Replaces 6 oils with Gulfcut 31C, cuts machining costs 15%...

GULF MAKES THINGS

Three years ago, Holt Products Company, Holt, Michigan, producer of precision industrial, automotive and agricultural parts, was using six different cutting oils in automatic screw machine and turret lathe work. Here was a chaotic and costly inventory problem which Holt Secretary Irving Hunt was eager to eliminate.

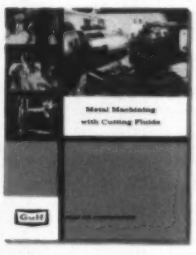
Acting on a Gulf Engineer's recommendations, Holt switched to just one cutting oil for all requirements. That one is Gulfcut 31C, a sulfurized mineral-lard oil possessing heavy load-carrying and anti-weld properties. Today, Mr. Hunt says, "Not only are we saving money by standardizing on this one superior cutting oil, but we are producing better work than ever, with few rejects. The increase in production and the longer life of our high-speed tools have meant a saving of at least 15% in over-all machining costs."

Perhaps some of your inventory and machining problems can be solved by one or more of the outstanding



RUN BETTER!

oils in the complete Gulfcut line. See for yourself how Gulf makes things run better! Just call a Gulf Sales Engineer at your nearest Gulf office. Meanwhile, send for your free copy of "Metal Machining with Cutting Fluids," the new 116-page handbook on their selection and use.



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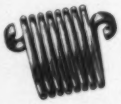

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and other things

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Answer your "where to get it" questions– by calling on the versatile experience represented by these typical springs and stamped parts. Here is unusual ability to analyze your part from both design and production efficiency and to make cost-saving contributions where possible. Whether your requirements are large or small, routine or extreme precision, you'll get a better brand of service and quality from the best springmakers in the business.

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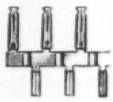

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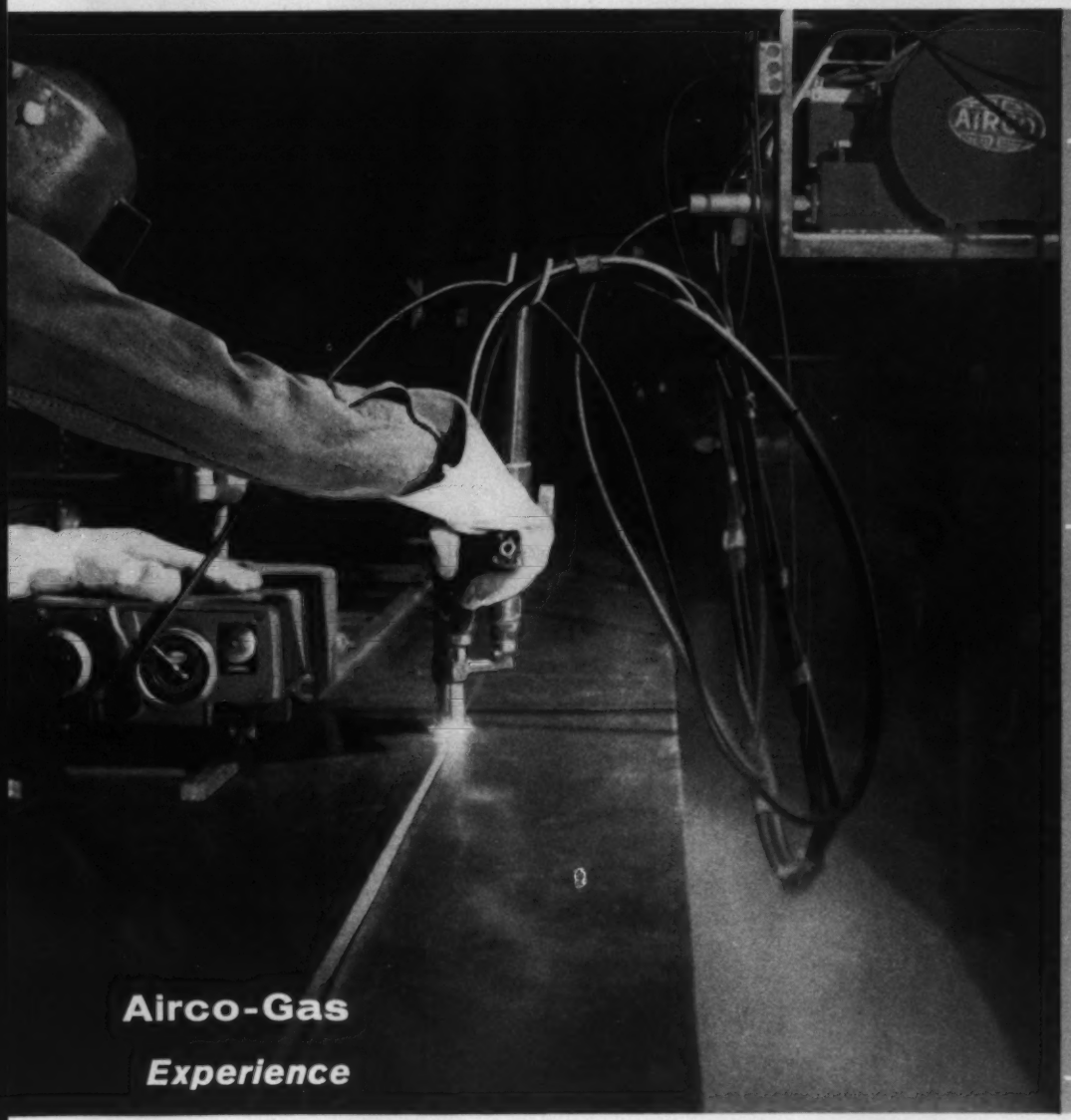
AIRCO GAS — ARGON, IN THIS CASE — and Aircomatic® equipment — do double duty here. An aluminum trailer manufacturer cuts aluminum plate to size with Aircomatic and argon . . . then welds the trailer parts — with the same equipment.



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OXYGEN
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can benefit your operation, too

Working with exotic or reactive metals? Keep them tame as a puppy with Airco helium or argon. Whether you're melting, casting, welding or even arc-cutting them—they work easily under their protective blankets of Airco gas.

And remember that other Airco gases such as oxygen, nitrogen, hydrogen, acetylene and carbon dioxide are always ready to serve your metalworking operations.

Let Airco specialized gas knowledge work for you. Call your nearest Airco office.

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See Airco Booth 303, Welding Show, Los Angeles, April 26-28.

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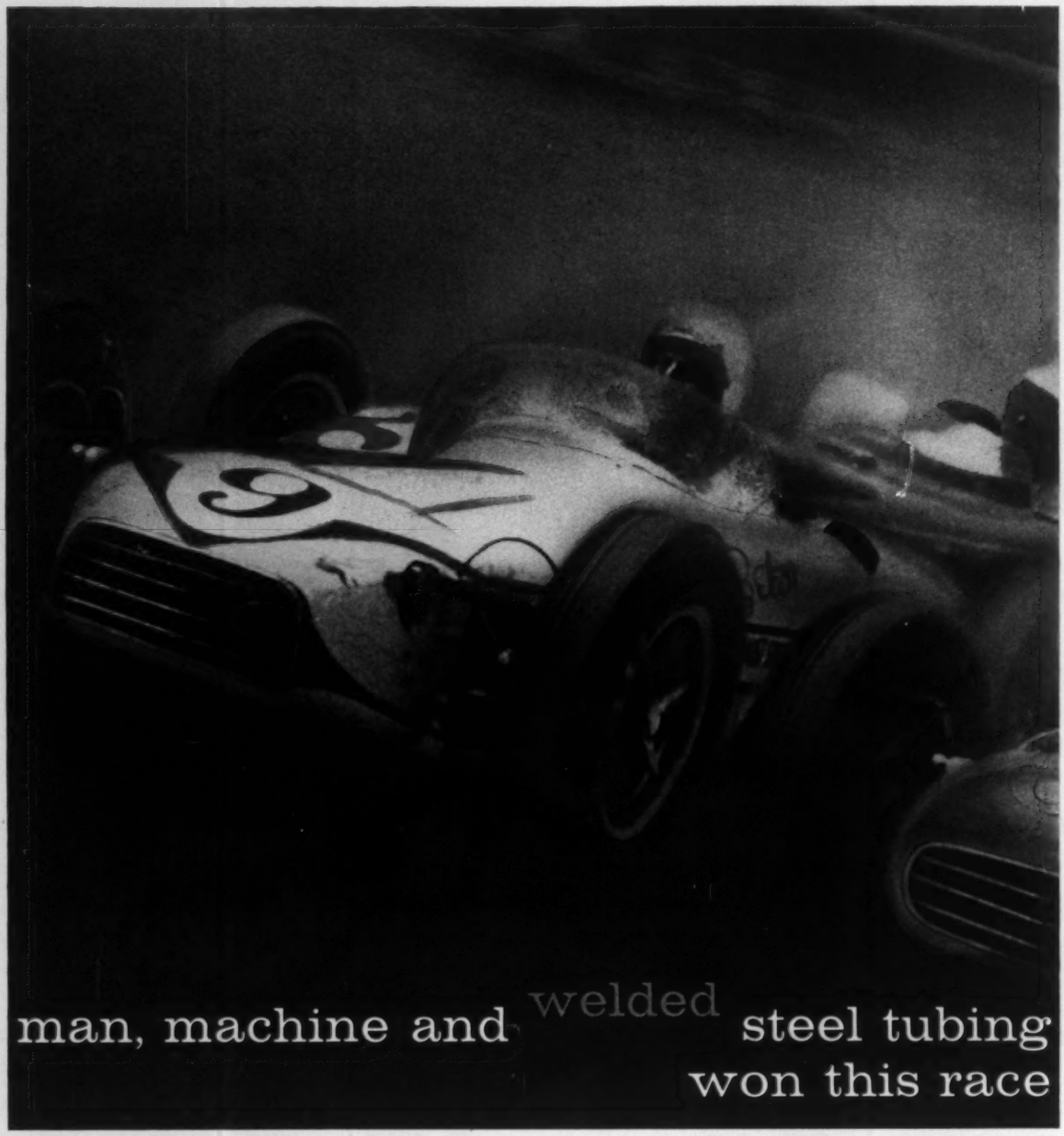

You who are responsible for the purchase of tubular goods are assured highest quality and product reliability when you specify Standard. Over the past forty years Standard has supplied countless miles of electric weld boiler and heat exchanger, pressure and mechanical tubing and oil country tubing and casing to chemical plants, refineries and industries around the world. Let Standard specialists analyze your problem—quote on your job.

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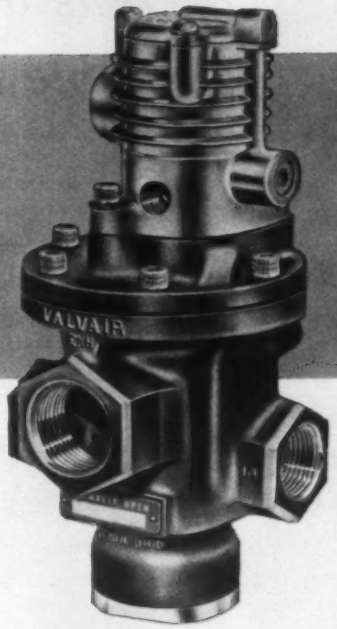
Welded stainless tubing and pipe • Welded carbon steel mechanical • Boiler and Heat Exchanger • Exclusive rigidized patterns • Special Shapes • Oil Well Tubing and Casing • Light Weight Pipe • Steel Tubing—Sizes: ½" OD to 6" OD—.028 to .270 wall • Stainless Pipe and Tubing—Sizes ¼" OD to 4¾" OD—.020 to .187 wall.

split-second response!
more work per hour!

with Valvair® HI-SPEED INLINE VALVES

- solenoid coil guaranteed against burn-out for life of valve
- instant-action control • air-cushioned poppet
- multi-million cycle dependability • JIC pilot



HI-SPEED INLINE with integral pilot, 2- or 3-way, NO or NC, ⅜ to 1¼ in. NPT.

Short poppet travel in Valvair's HI-SPEED INLINE provides maximum flow almost instantaneously. This shortens machine cycle time . . . lessens brake and clutch slip . . . provides more accurate cuts on high speed cut-offs . . . decreases set-up time . . . minimizes drift, for safer operation.

For increased production . . . lower costs . . . greater safety . . . specify Valvair HI-SPEED INLINE valves.

Write for free Bulletin HIN. Address: Valvair Corporation, Akron 9, Ohio, Dept. ST-460.

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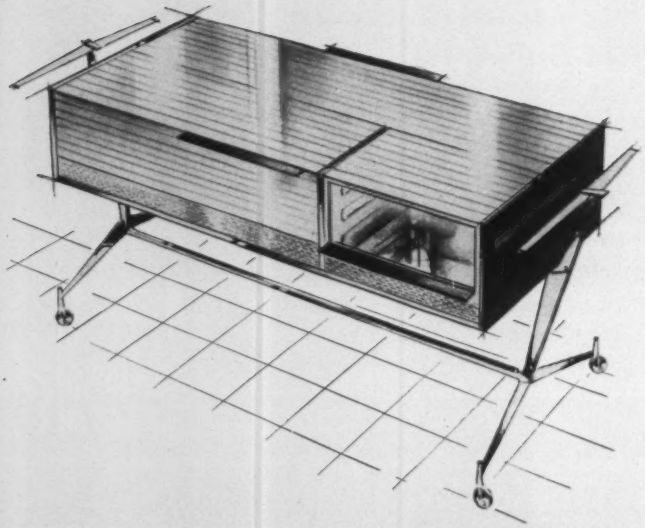
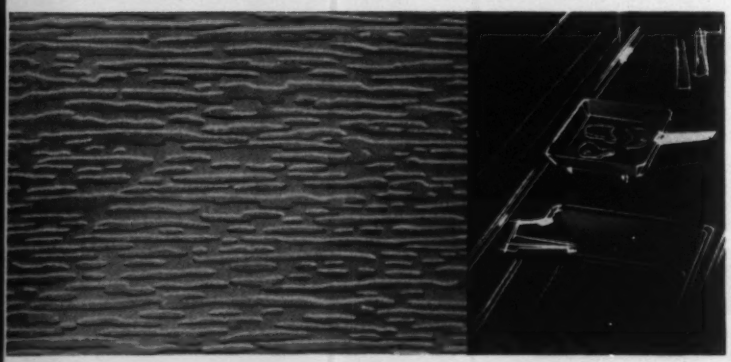
Carl Sundberg and Montgomery Ferar joined fortunes in 1934 and since have had a great influence on improving the design of mass-produced consumer and industrial products.

One of the largest of the nation's recognized design firms, they have put their talents to work on hundreds of nationally known products ranging from pencil clips to heavy-duty motor trucks and electronic computers. Recognized leaders in the design of electrical appliances, they are permanently retained by many of America's best known appliance manufacturers.

Sundberg-Ferar designs a unique, portable kitchen caddy with wonderful...



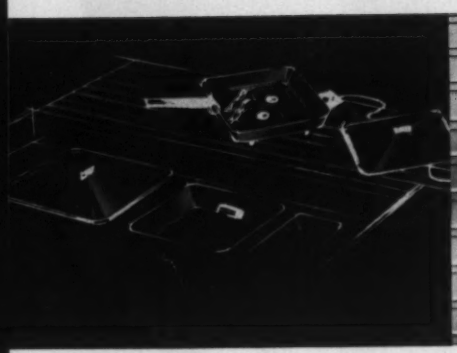


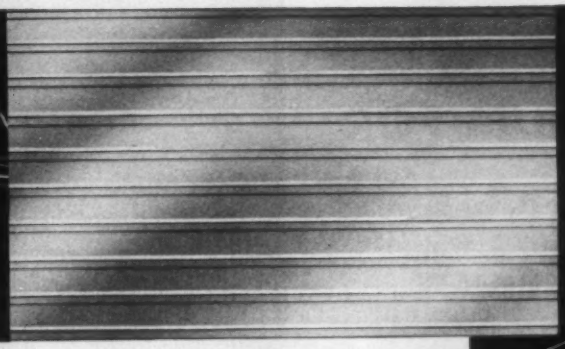
• Sharonart® is truly the designer's metal. Evidence of this fact is this modern kitchen caddy designed in Sharonart® by Sundberg-Ferar, one of the oldest, largest and most successful industrial design firms in the United States.

The portable caddy permits complete cooking facilities anywhere inside or outside of the home. To make sure it would be able to absorb the punishment of daily use, yet stay bright and clean, Sundberg-Ferar designed the cabinet and working areas in patterns of Sharonart® Stainless. Wood grain Sharonart® steel panels at each end give the furniture-look that blends with other home furnishings.

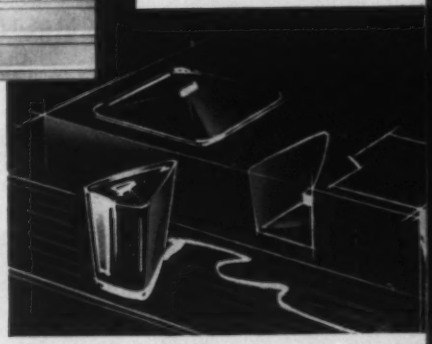
The textured beauty of Sharonart® can be produced in an almost limitless number of patterns. This permits easy model changing. It's easy to clean and will not show wear. It can be painted, plated, or vinyl coated with beautiful results. Is it any wonder that more and more of the leading designers are turning to modern Sharonart® for modern product design? *Sharon Steel Corporation, Sharon, Pa.*

About the portable kitchen caddy: This is a design only, produced to show the tremendous utility of Sharonart®. All the seemingly built-in utensils are self-energized, and can be plugged into any electrical outlet as well as being used with the caddy itself. The rotisserie has vertical elements that can be moved closer together for the smokeless vertical broiling of steaks. All utensils are removable and can be used at the dinner table for gourmet cooking. Plenty of workspace is provided for complete meal preparation right at the caddy.

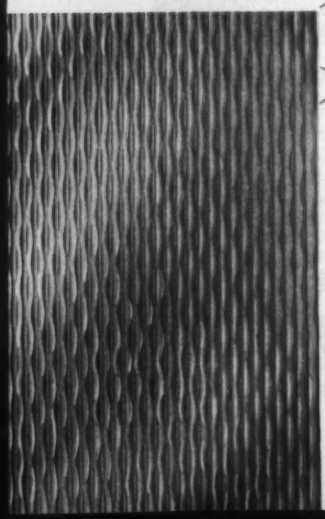




Steel



SHARONART®



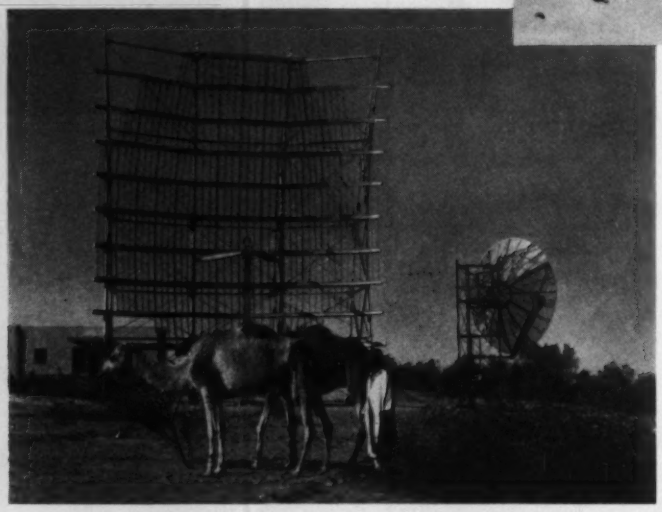
SHARON *Quality* STEEL

SHARONSTEEL

EXPANDED ALUMINUM FOR ANTENNA EFFICIENCY...

from the Arctic

The two radar antennas, shown as a background for the caribou in this actual photo, are part of the country's defense setup.



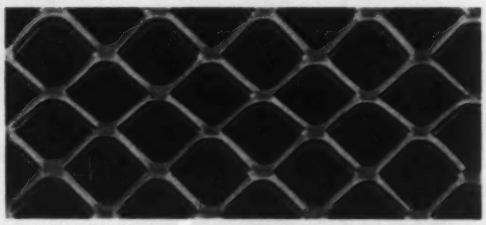
to the Sahara

These antennas beam voice signals to the troposphere, 6 to 12 miles above the earth's surface. From there the signals are reflected back hundreds of miles. (Photos courtesy of D. S. Kennedy & Co.)

On the job, in totally diverse sections of the world, and differing as to purpose, the antennas illustrated have one thing in common: Penmetal *Square Mesh*. This is a special expanded aluminum mesh developed by Penn Metal Company for antenna use. It is the most versatile reflecting surface yet developed for radio, radar and telemetry reception, providing constant response for radio energy regardless of polarization.

The upper photo, taken in the Arctic, shows units of the Dew Line, the far-flung "ears" of the country's defense setup. The antennas in the desert are part of a new communications system for Libya that permits telephone conversations over great distances without the use of poles or wires.

Square Mesh is but one of many unusual products developed by Penn Metal Company in cooperation with industrial designers during the last 90 years. Put this experience to work tailoring special meshes to your requirements. Send for a copy of catalog 521-EM.



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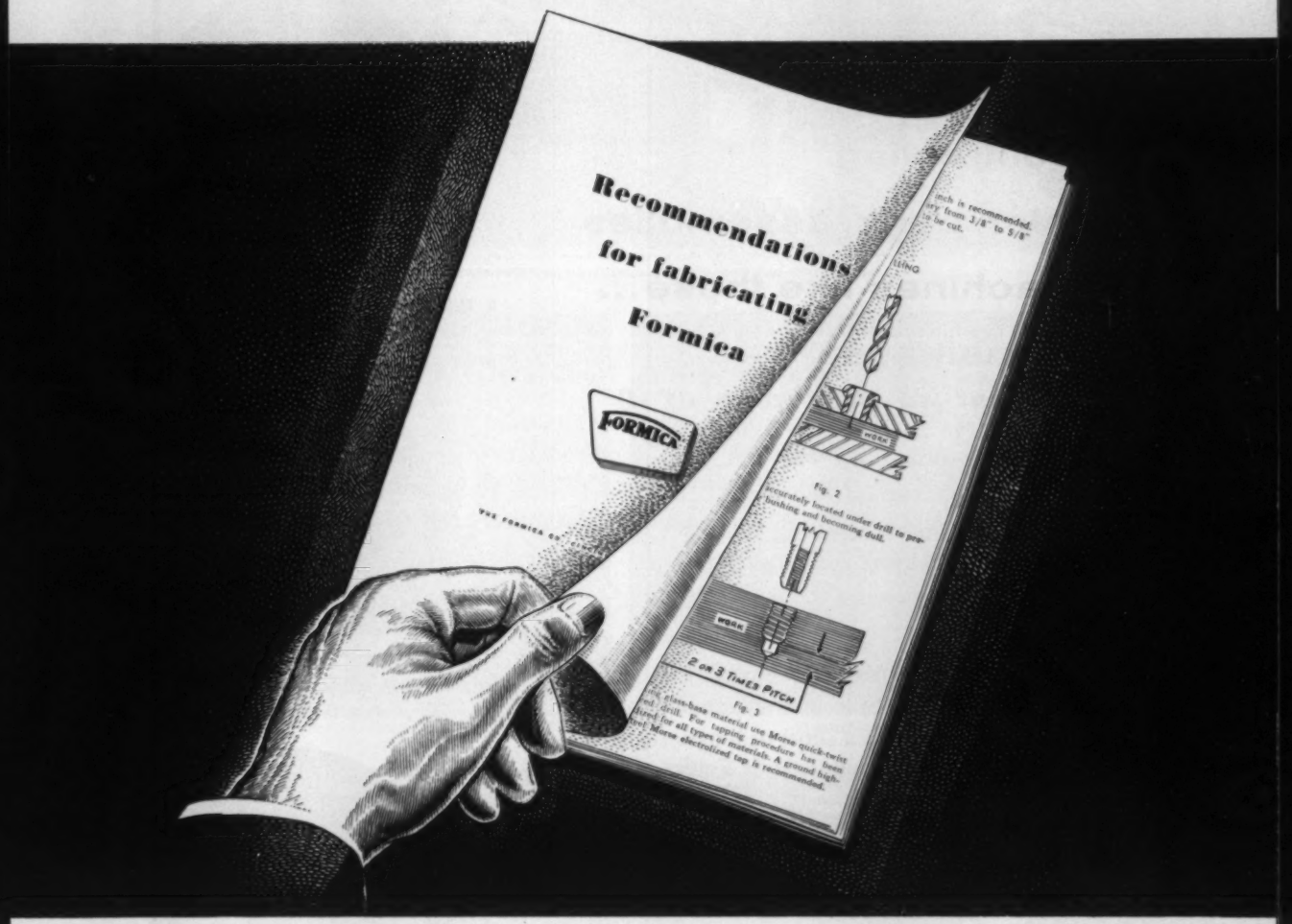
Penmetal

a name to remember

PM-240

FORMICA SPECIFIES MORSE TOOLS



Morse Electrolized Tools proved best by test for tapping – drilling glass, fabric and paper – base materials.

Formica pulls no punches in its installation manual . . . they recommend Morse. Why? Because they proved Morse Electrolized Taps and Drills *best* by test for installing their material.

Prove to yourself what Formica and other manufacturers have found . . . the exclusive Morse *Electrolizing* Process gives up to 30% longer tool life on the toughest jobs – no matter what base materials are used, there is a Morse Tool designed to help you cut production costs . . . build a better product.

See your Morse-Franchised Distributor. He is the *only* man to see when you want the best in cutting tools. Call him *today*.

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(but we want more of it)

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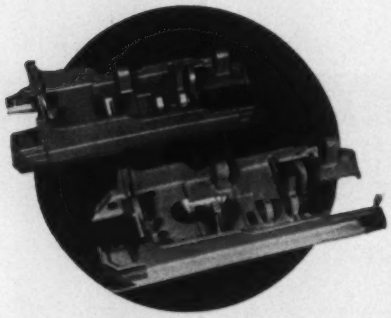
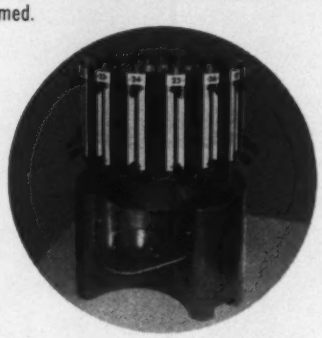
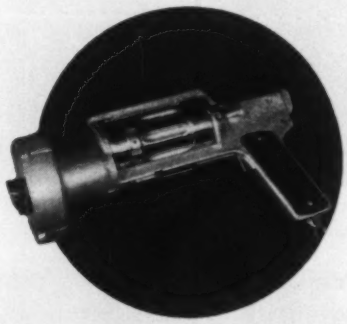


A TMW gray iron casting before and after precise machining, annealing and finishing operations were performed.



Paint dispenser was economically mass produced for a major manufacturer in TMW's modern shops.

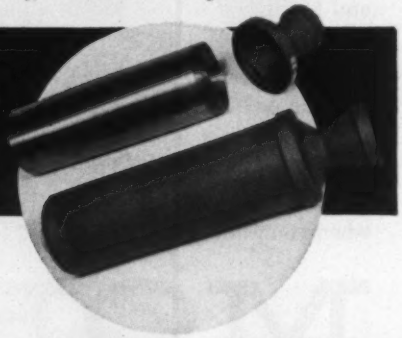


"The world's first and only automatic stud fastener" . . . (another example of TMW precision machining and assembly) carries a LIFETIME guarantee.

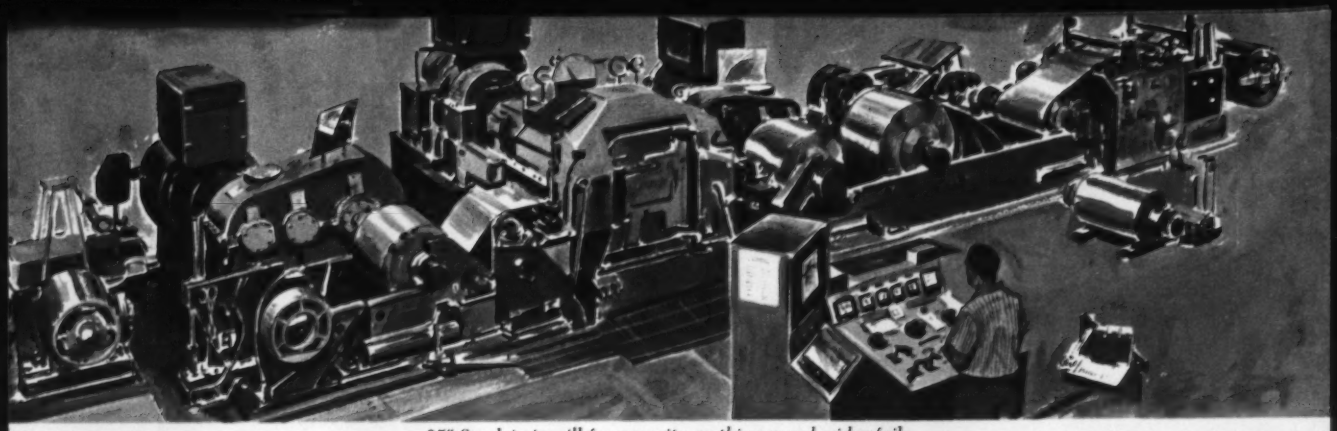
* Includes 1,000,000 sq. ft. of manufacturing space, 1200 *modern* machine tools, completely mechanized foundry (one of the world's largest), 3000 skilled craftsmen with a corps of top designers and engineers.

TEXTILE MACHINE WORKS

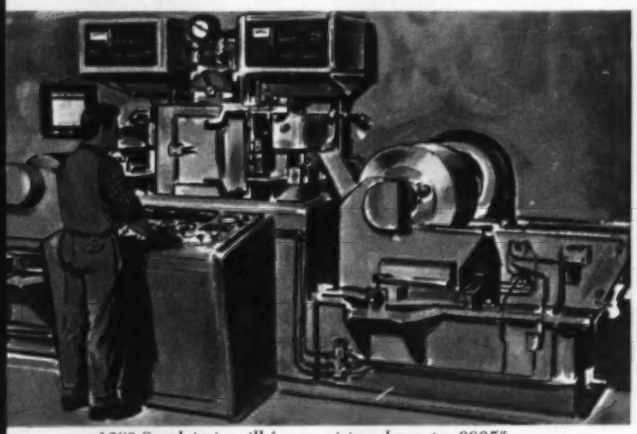
Contract Division • Reading, Pennsylvania



Jato units, used on the "Honest John" rocket to make it spin, are machined to ±.0002" tolerances and hydrostatically tested to meet strict government specifications.

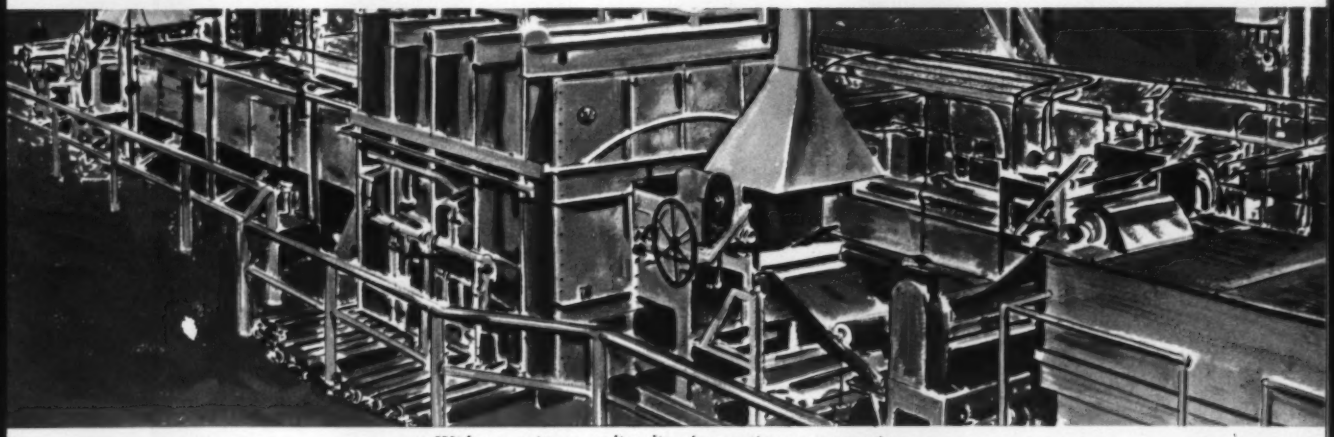


25" Sendzimir mill for capacity on thinner and wider foils



12½" Sendzimir mill for precision down to .0005"

Precision slitting to custom requirements



Wide capacity annealing line for continuous processing

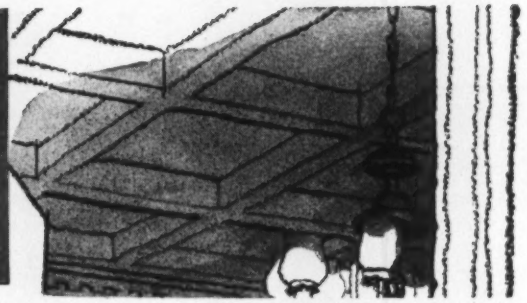
CAPACITY PLUS VERSATILITY EQUALS PERFORMANCE

Reliable Rodney says:
Make Rodney your source for stainless and alloy strip down to .0005".

RODNEY ROLLED IS QUALITY CONTROLLED

RODNEY METALS, INC., (MILL) NEW BEDFORD, MASS.
West Coast Office and Warehouse: 5462 East Jillison St., Los Angeles 22, Cal.

"We were taking the plan for granted"



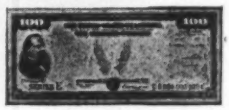
"You know, Ed, it's so easy to take these things for granted. I knew we'd put in the Payroll Savings Plan a long time ago. So I just assumed we had a good, sizable number of our employees who were buying U.S. Savings Bonds regularly.

"Well, last week our chairman asked me for the exact figures. When I checked up I found we had less than a third of our people making regular use of the Plan. We needed to have someone explain—in person—the convenience and soundness of this fine thrift program.

"I contacted our State Savings Bonds Director right away. With his quick, friendly help we set up a thorough canvass of everybody on the staff. We found that many of our company family were just waiting to have someone tell them how simple it is to share in this sound, systematic thrift plan. Then the polite suggestion, 'And why not start now?' really did the work. Today we have a participation we're proud of, and we're taking steps to increase it still more, every payday."

Experience of leading companies shows that spreading Payroll Savings information through the organization, person-to-person, results in quick increases in participation. And that brings such welcome benefits as lower employee turnover, better safety records and the keen satisfaction of helping your people to contribute to our Nations Peace Power.

ALL U.S. SAVINGS BONDS—OLD OR NEW—EARN ½% MORE THAN BEFORE

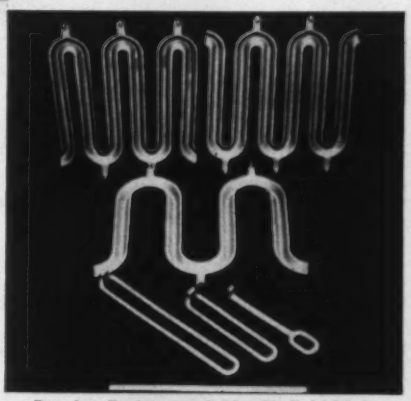


STEEL
The Metalworking Weekly

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

Duraloy Tubes and Grids *to Meet Exacting* THE ELECTRIC EF FURNACE CO. GAS • OIL • ELECTRIC *Specifications*

Duraloy Centrifugally Cast Tubes 7'9" long, 7" O.D., ⅜" wall. 28 Cr 10 Ni; some of HOM alloy.



Duraloy Resistance Grids—Shell Molded. 18 Cr 38 Ni; some of special HOM alloy.

Heat treating furnaces need high alloy castings... radiant heat tubes for gas or oil fired... resistance grids for electrical... and castings for handling material through the furnace. *And the castings must be fail-proof!*

One reason—indeed the major reason—why The Electric Furnace Company, Salem, Ohio, has leaned so heavily on Duraloy for its castings is that over the years Duraloy Castings have established a fine record for durability and uniformity. And with the recent development of Duraloy HOM, the furnace company can work towards higher temperature operations. HOM can be used quite broadly at temperatures up to 2200°F and in a limited way to 2300°F. It can be cast statically, centrifugally and shell molded.

When such an authority on heat treating furnaces as Electric Furnace so consistently selects Duraloy castings for these furnaces on which it has built an enviable reputation... that preference suggests quite strongly that Duraloy castings are consistently sound and skillfully alloyed to meet exacting high temperature applications. This same skill offers comparable values to all who require high alloy castings.

Annealing furnace designed and constructed by The Electric Furnace Company used for cycle annealing of enameling iron strip and bright annealing of cold rolled strip. Three methods of heating: direct fuel fire; fuel fired radiant heat; and electric resistance used in the various zones.

DURALOY Company

OFFICE AND PLANT: Scottdale, Pa.

EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.
ATLANTA OFFICE: 76—4th Street, N.W.
CHICAGO OFFICE: 332 South Michigan Avenue
DETROIT OFFICE: 23906 Woodward Avenue, Pleasant Ridge, Mich.

CORRECT LUBRICATION IN ACTION...IN AN EMERGENCY!

FROM DOUBLE DISASTER

ATCHISON DAILY GLOBE
Charles Kennedy, Who Died In Today's Flood, Was The Man Who Inspired The "Professor" So Often Quoted In This Line
DEVASTATING FLOOD HITS ATCHISON
10-Foot Wall Of Water Razes Buildings In Downtown Area; Two Perish; Loss In Millions
Torrent Follows Early Morning Storm; Traps Many In Their Homes
Atchison Will Rebuild
WATER DANGER!
Respond To Emergency
Mobilgas

Action shown here recalls the 1958 flood disasters in America's largest all-electric steel foundry operated by LFM Company, Atchison, Kansas. This division of Rockwell Manufacturing Company is one of the largest valve manufacturing plants in the world and a leader in steel-casting experimental work.

Mobil Correct

TO FULL PRODUCTION !

How Mobil helped LFM Company keep disaster costs to a minimum . . . return production to normal after two floods within three weeks.

ATCHISON, KANSAS; JULY 1958:

It couldn't happen—but it did! A second vicious flood only three weeks after one had ripped through the LFM Company's plant in Atchison, Kansas.

In both floods Mobil engineers speeded emergency aid, putting in 288 hours of voluntary service, working shoulder to shoulder with LFM personnel on many aspects of the disaster problem.

- Located and sent in portable pumps to flush out contaminated oil reservoirs.
- Trained people to flush, clean and rust-proof machines and parts.
- Prepared tanks for removing rust from corroded parts—by lining with wax, installing racks and filling with rust-removing acid.
- Obtained dispensing equipment to replace that missing.

As a result of this kind of help, 897 finished worms for motor driven valves were saved and delivered to the customer on time . . . saving LFM $36,000. In addition, 1705 gallons of oil were identified and reclaimed. Everything possible was done to protect machines and restore normal production.

This is Mobil Correct Lubrication in Action in an emergency! The remarkable cost-cutting lubrication program that's helping leading industries cut costs and improve profits. Why accept less for your plant?

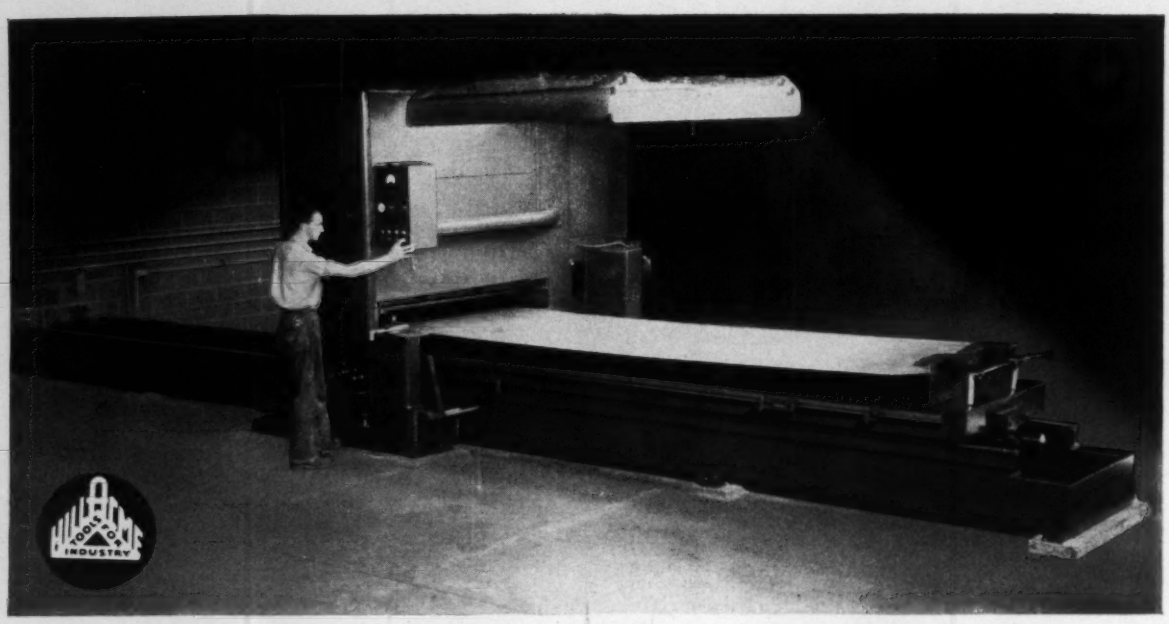
SAVINGS *DURING NORMAL PRODUCTION THROUGH CORRECT LUBRICATION IN ACTION!*

Drill tapping speed increased . . . tool life extended 316%. Troublesome radial-drill tapping operation at LFM was studied by Mobil representative. He recommended use of a Mobil cutting fluid. This product increased number of holes tapped between tool changes by 316%. Tapping speed was increased 89%.

Storage problem solved—$11,388 saved. Storage of unmachined castings posed problem for LFM. Outdoor storage was desirable but castings rusted, had to be sandblasted before they could be finished. Mobil recommended rust preventive that eliminated sandblast . . . reduced handling time . . . saved $11,388.

MOBIL OIL COMPANY
150 East 42nd Street, New York 17, N. Y.

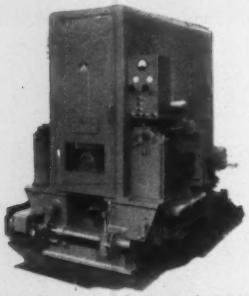
Lubrication



HILL Sheet and Plate polishing machine with reciprocating table and vertical 2-ROLL head.

With YOUR OWN HILL Abrasive Belt Grinding and Polishing Machine you can:

Vertical 2-ROLL HEAD. Two rolls, accurately controlled for speeds and pressures with easy adjustment for proper tension of the endless abrasive belt. A variety of grits are available.



HILL Pinch Roll type with vertical 2-ROLL head for polishing strip or single pieces. Can be used singly or in multiple units for line production.

1. Prepare the precise finish best suited to your needs.

2. Insure close inventory control of finished material.

3. Save up to half the cost of buying prepolished sheet and plate.

Increasing volume production points up the advantages of a HILL Grinding & Polishing machine in your own plant. No delay in deliveries — No premiums paid to outside sources for material that ALMOST meets requirements.

HILL 2-ROLL Vertical Abrasive Belt Grinding and Polishing machines are made in two general types for producing superior finishes on flat surfaces as required by manufacturers of decorative plastics, auto bumpers, engravers plates, home appliances, etc. Both types are built in polishing widths up to 60". Larger sizes can be furnished.

THE HILL ACME COMPANY

1209 WEST 65th STREET • • • CLEVELAND 2, OHIO

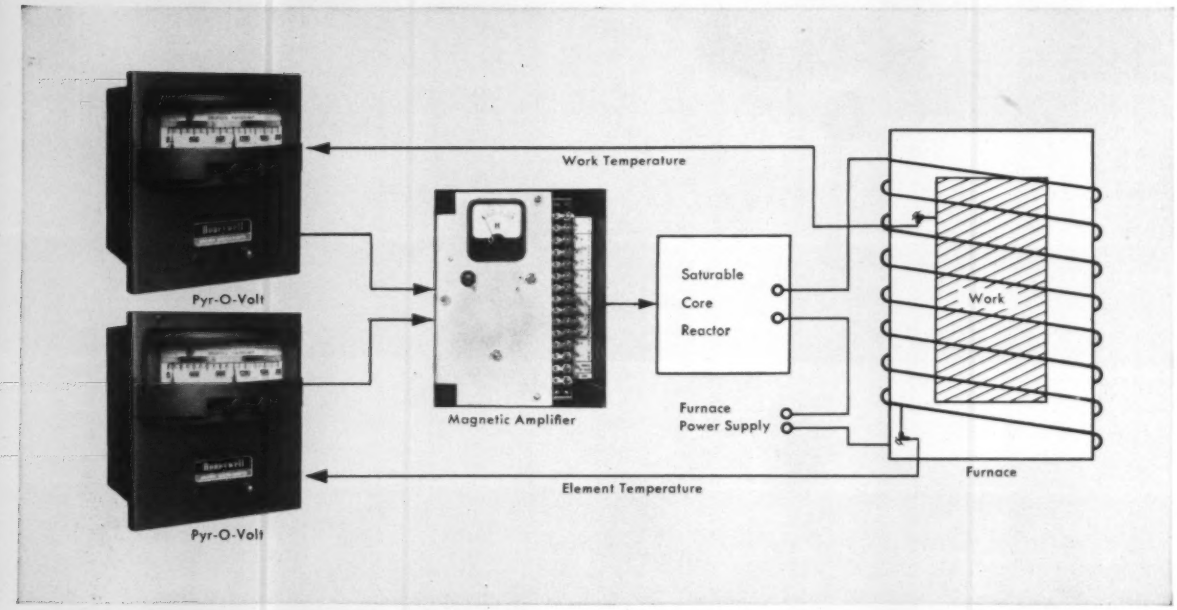
"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • "ACME" FORGING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • ROTARY SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES • MATERIAL HANDLING EQUIPMENT

J & L Steel Service Centers—efficient and dependable. You can count on fast delivery from stock at The Department Store of Steel. Cold-finished bars like these are just a part of J & L's increased inventories of steel, stainless and aluminum available for immediate shipment. Add this to J & L's unparalleled expansion, new buildings, the latest in machinery and equipment, skilled warehousemen trained to give *extra* care to every order and you'll see why J & L customers today are getting faster, more efficient service.

Take advantage of the streamlined, time-saver service J & L offers. Count on The Department Store of Steel. You'll get exactly what you want—when you want it.

J & L Steel Warehouse Division

CHICAGO • CINCINNATI • CLEVELAND • DETROIT
HAMMOND • INDIANAPOLIS • LANCASTER • LOUISVILLE • MEMPHIS
NASHVILLE • NEW ORLEANS • NEW YORK • PITTSBURGH



Electric furnace control system prevents overshoot, protects heating elements

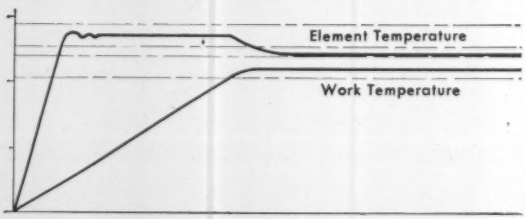
Here's the simplest, most economical way to bring electric furnace temperatures up to work level rapidly and safely using saturable reactor control.

This accurate Honeywell system holds fast-rising furnace temperature to a safe value as the slowly-increasing work temperature approaches its control point. The system consists of two *Pyr-O-Volt* controllers and a magnetic amplifier. Both controllers feed signals to the magnetic amplifier until work temperature reaches set point, then the work temperature controller assumes primary control of the system.

This relatively inexpensive system requires minimum maintenance, as no relays or other mechanical switching means are used. Both controllers have provision for fail-safe thermocouple burnout protection. In addition, automatic current limiting can be supplied with the system should you require extra protection for molybdenum heating elements.

Your nearby Honeywell field engineer can give you complete details on applying this system to advantage in your plant. Call him today . . . he's as near as your phone.

MINNEAPOLIS - HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.



Curves show the relationship of work temperature and element temperature vs. time in the *Pyr-O-Volt* furnace control system.

Honeywell

First in Control

SINCE 1885

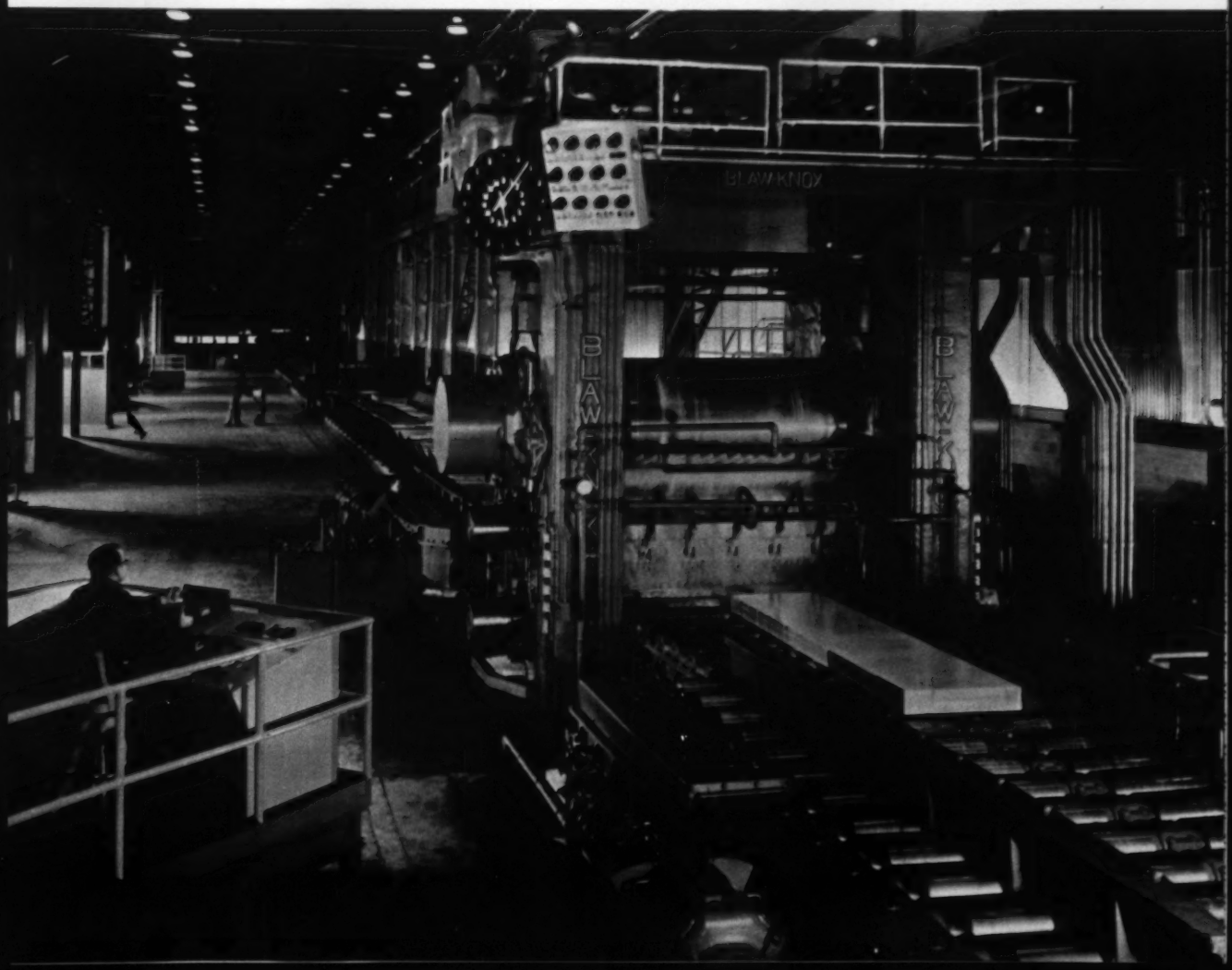
75th YEAR

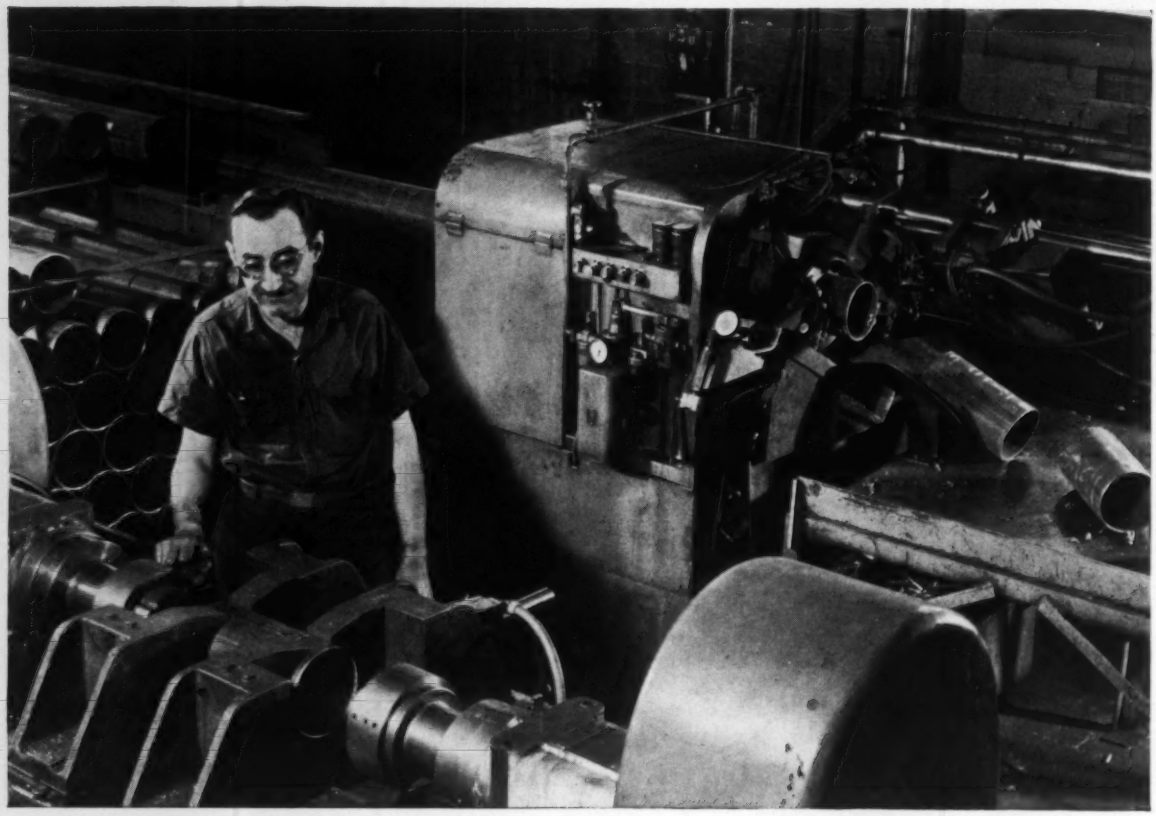
PIONEERING THE FUTURE

BLAW-KNOX

Blaw-Knox designs and builds a full range of mills for the reduction of aluminum and other non-ferrous metals. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals, sheet and strip processing equipment, electrolytic tinning, annealing, and galvanizing lines, seamless pipe and tube mills, draw benches, and cold draw equipment, Blaw-Knox Medart cold finishing equipment, iron, alloy iron and steel rolls, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings. Blaw-Knox Company. Foundry and Mill Machinery Division, Blaw-Knox Building, 300 Sixth Ave., Pittsburgh 22, Pa.

32- and 56-inch x 96-inch, 4-high reversing hot strip mill at the Terre Haute plant of Anaconda Aluminum Company.





Tubing for this job must meet the most rigid specs

This manufacturer of heavy-duty idler rollers has turned to increased automation and tighter material specs to improve production. Note automatic feed and cutoff of tubing in background . . . the quick setup for double-end counterboring at the next station.

Tubing for this job must meet highest standards for uniformity of size, straightness and close tolerance of concentricity. But where do you find large O.D. tubing to meet these rigid specs? At Ryerson, of course—home of the industry's tightest quality controls.

Here you choose from the nation's largest stocks. And you're assured of consistent quality that is so important to meet the demands of automation. The more automated your production line, the less chance for visual inspection, and the more dependent you are on the consistent quality of the raw material.

So when you next need tubing or help with selection and application problems, be "Metalogical"—call Ryerson.

The type of tubing you need is here

Carbon Steel Tubing—seamless and welded, round and square, cold drawn and hot finished.

Alloy Steel Tubing—seamless rounds.

Fluid Power Tubing—Rockrite cylinder finish, seamless and welded; hydraulic fluid line; seamless and welded cylinder tubing.

Structural Tubing—square, rectangular and round.

Ledloy® 170 Tubing—fast machining, 170 sfm.

Stainless Pipe and Tubing—cold drawn seamless and welded. Also welded ornamental.

Aluminum Pipe and Tubing—all commonly used alloys and tempers.

PVC Pipe and Tubing—time-tested Ryertex®-Omicron PVC.

METALOGICS
RYERSON PLUS VALUES

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

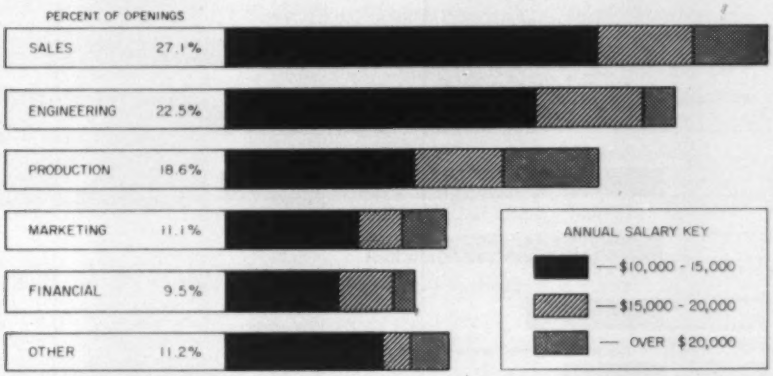
RYERSON STEEL

Joseph T. Ryerson & Son, Inc., Member of the INLAND® Steel Family

PLANT SERVICE CENTERS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS
LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD

How Executive Job Openings Compare

Sales managers are in greater demand today than any other kind of executive, a survey by Executive Manpower Corp., New York, discovers. Here's a breakdown of current openings by type of job and salary level:



Consumers Are Ready to Buy

Consumer sentiment and inclination to buy durable goods is strong, the University of Michigan's new survey of consumer attitudes finds. New car buying intentions are up 20 per cent from a year ago; intentions to buy houses and household equipment are up somewhat. But buyers are worried about inflation: 7 in 10 expect to pay more for the items they buy this year.

Reactor on Skids to Cut Arctic Power Costs

Last week, Alco Products Inc. unveiled this key skid assembly for a nonexperimental, prefabricated, nuclear powerplant to be installed at Camp Century, the Army's polar research and development center, 138 miles east of Thule, Greenland. The reactor will be flown to its icy home and installed in only six weeks by 31 men. Cost, installed: $4.1 million. It'll produce 1560 net kilowatts of electricity plus 1 million Btu of steam for heat—equaling 850,000 gallons of diesel oil.

Automatic Brain Flies Jet Across Continent

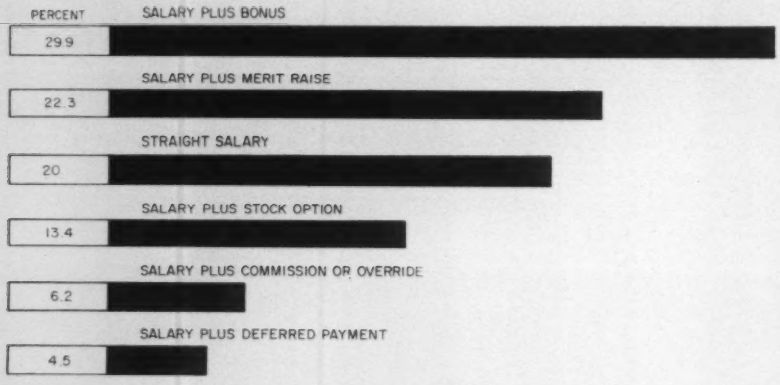
The world's "brainiest" airplane, an F-106 Delta Dart, has flown itself nonstop from Palmdale, Calif., to Jacksonville, Fla. Flying time was 3 hours 17 minutes. Key to the automated flight was the plane's MA-1 navigation and fire control system, built by Hughes Aircraft Co., Culver City, Calif. The flight was preprogramed; range and bearing information were flashed to the speeding aircraft by tactical air navigation stations across the coun-

Technical Outlook—Page 135 Market Outlook—Page 175

try. The jet's position was automatically compared with the prescribed route, and signals were supplied to the flight control system for heading and altitude corrections.

How Executives Are Paid

More upper level executives are paid on the basis of salary plus bonus than by any other method, a survey by Executive Manpower Corp., New York, discloses. Here's how the popularity of various methods compares:



Aluminum Shoots for More Building Business

Reynolds Metals Co. is setting up 18 "one stop shopping centers" for 35 standard aluminum building products. Object: Make it easier for the builder and homeowner to get aluminum items used in residential construction and to provide technical assistance. The centers will distribute to lumberyards. Reynolds expects the average new home in 1965 to contain 480 lb of aluminum vs. 150 today.

U. S. Steel Adds Light Touch to Serious Market

This exhibit, "The Wonderful, Wacky World of Sleep," kicks off a campaign to boost sales of inner spring mattresses and box springs. A project of American Steel & Wire, it's part of United States Steel's consumer marketing program. The exhibit is in the lobby of the East Ohio Gas Co., Cleveland. About 186,000 tons of wire are used annually for mattresses and springs.

Threat from Abroad Is Distant for Laundry Appliance Makers

Home laundry appliance manufacturers need fear no extensive dents in their domestic sales resulting from foreign competition in the next five to eight years, believes James E. Stover, manager of product planning. Consumer

Goods Export Dept., International General Electric Co. The sophistication to which the industry has elevated the U. S. consumer is the main deterrent, he thinks.

Columbium Adds Weldability to New High Strength Steel

A. G. Barkow, research engineer, National Gas Pipeline Co. of America, watches a welder join two sections of a new, high strength pipe which can be welded in subzero temperatures. Developed by Great Lakes Steel Corp., a division of National Steel Corp., the GLX-W steels contain columbium. Potential applications include pipelines, truck frames, railroad equipment, and pressure vessels. The steels will be available in yield strengths of 45,000 to 60,000 psi. National Gas Pipeline is using the steels to make dresser couplings, a pipeline maintenance item.

Here's How to Keep Employees on the Job

Reward "presenteeism" and penalize absenteeism, 200 executives advised in a survey by *Industrial Relations News*. Suggested rewards include: An extra week's pay at the end of the year, extra vacation time, and using attendance as a factor in determining bonuses. Suggested penalties include: A demerit system leading to discharge, loss of seniority, deferment of pay increases.

Metalworking Pays More for Grievance Time

Many more metalworking companies pay for time spent on grievances than do firms in other industries, finds a Department of Commerce study:

	Percentage of agreements		
	Do Pay	Don't Pay	No Provision
All industries	42%	7%	51%
All manufacturing	52	8	40
Primary metals	42	36	22
Fabricated metal products	63	12	25
Machinery, except electrical	70	9	21
Electrical machinery & equip.	68	2	30
Transportation equipment	77	5	18
Instruments, related products	80	0	20
Stone, clay & glass products	37	3	60
Rubber & plastic products	60	8	32
Furniture & fixtures	44	6	50
Lumber & wood products	0	0	100
Nonmanufacturing	23	5	72

Prefab Home Builders See Record in '60

Look for 140,000 to 150,000 prefabricated homes to be produced in the U. S. this year, predicts the Home Manufacturers Association. That compares with last year's record 132,054 units—20 per cent more than the 1958 total. The prefab people now claim 12 per cent of the market for single family housing. New companies are jumping into the home manufacturing industry at the rate of about one per week, says the association; it estimates the present number at 400. Prefab homes were erected in every

state last year: Ohio led with 20,390, followed by Illinois (13,579) and Indiana (11,552). Canada's eleven home manufacturers started 2226 units last year.

Straws in the Wind

February net new orders for metal cutting machine tools rose to $48.4 million —up about $5 million from the January level, reports the National Machine Tool Builders' Association . . . Atlantic Steel Co. has reduced prices of bright common nails as much as 15 per cent to combat foreign competition . . . Iron powder shipments reached a record 35,000 tons in 1959, says the Metal Powder Industries Federation . . . Ford Motor Co.'s San Jose, Calif., plant is turning out only Falcon cars . . . Bethlehem Steel Co. will hike the production capacity of its Sparrows Point, Md., plant nearly 10 per cent (to 9 million ingot tons annually) within the next two years . . . Aluminum Co. of America's new smelter under construction near Warrick, Ind., will have a yearly capacity of 175,000 tons instead of the 150,000 originally slated.

Rockwell Plugs Far East Investment

Willard F. Rockwell, president, Rockwell Mfg. Co., Pittsburgh, just back from a trip to eight Asian and Pacific countries, urges U. S. businessmen "to look into the bright prospects of that burgeoning market." He emphasizes: 1. "The market is immense; per capita income is rising rapidly; the risks of expropriation are small." 2. The countries need private capital investment. The Rockwell firm is considering the establishment of warehousing and manufacturing facilities in the Far East.

Lake Shipping Season Is Underway

Inland Steel Co.'s Wilfred Sykes became the first vessel to haul iron ore on the Great Lakes this season. It arrived at the Indiana Harbor Works last Wednesday from Escanaba, Mich. Another Inland carrier, the L. E. Block, was scheduled to leave the ore loading dock at Escanaba last week. Seven ore carriers owned by Pittsburgh Steamship Div., U. S. Steel Corp., are underway to Two Harbors, Minn. The self-unloader T. W. Robinson left Detroit last Monday for Toledo to open the navigation season for the Bradley Transportation Line, Michigan Limestone Div., U. S. Steel.

Metalworking Pulse

The Business Trend: STEEL's latest index figure reflects cutbacks in auto output and a seasonal dip in electric power consumption. Strengthening in rail carloadings was only nominal. **Autos:** Cutbacks continued at Ford Motor Co. and Chrysler Corp. plants. Output topped the year-ago week when the Easter holiday affected operations. **Steel:** Mills continued to hold ingot output close to 90 per cent of rated capacity.

- **INDUSTRIAL PRODUCTION**
  - Week ended Mar. 26 . . . 175†
  - Year ago 166
  - Details on Page 111
- **PASSENGER CAR PRODUCTION**
  - Week ended Apr. 2 . . 138,000*
  - Year ago 133,878
  - Details on Page 108
- **INGOT PRODUCTION RATE**
  - Week ended Apr. 3 . . 88.7%†
  - Week ago 91.1%
  - Details on Page 184

†Preliminary. *Estimated.

O-KNI-CO

MACHINE TOOL news

PRODUCTION FACTS THAT INCREASE YOUR PROFITS

PUBLISHED BY THE OHIO KNIFE CO., CINCINNATI, OHIO

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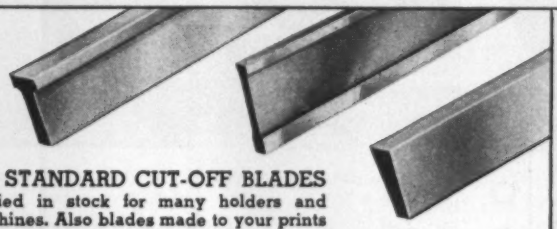

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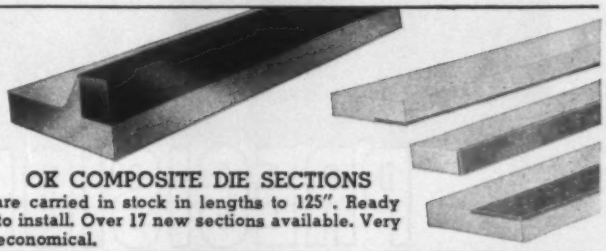

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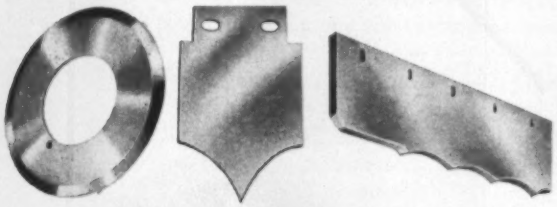

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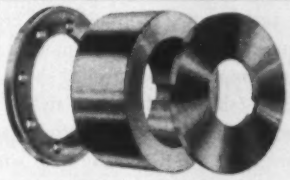

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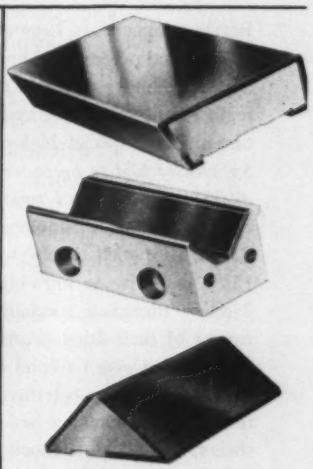

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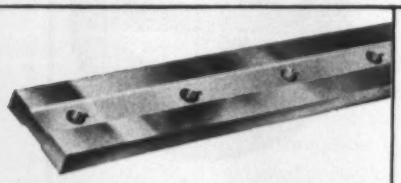

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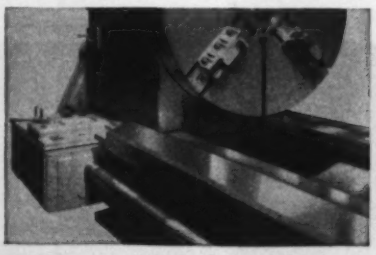
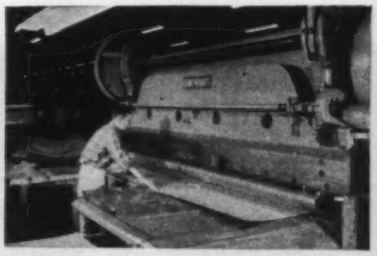
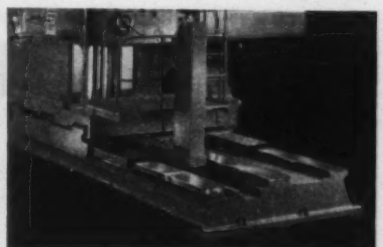


O-KNI-CO processed hardened ways on 60 inch lathe made by The Niles Tool Works.



65 ton Cincinnati Press Brake equipped with long-wearing O-KNI-CO processed shear blades.



O-KNI-CO hardened bedways, cross ways on a G. A. Gray Co. horizontal boring machine.

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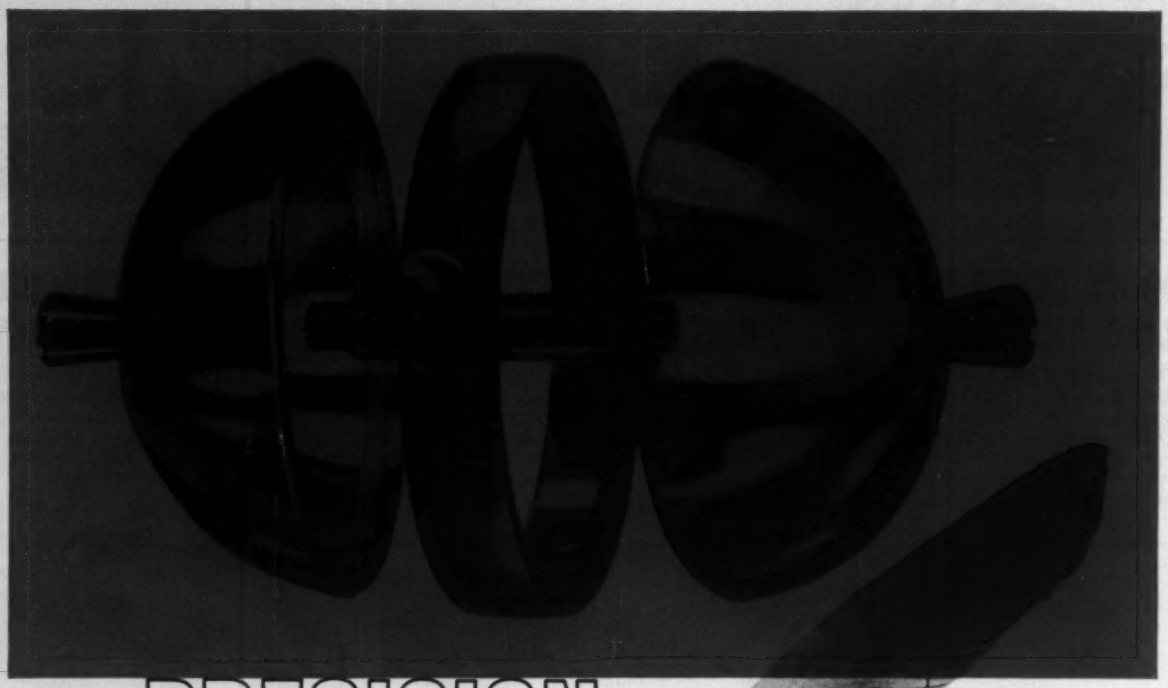


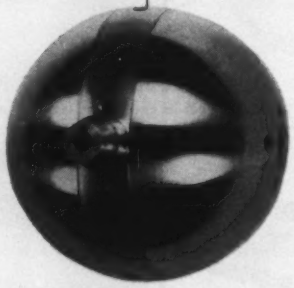
PRECISION:

Beryllium specialists, Leemath Incorporated of Long Island, create delicate and precise mechanisms in this high strength but toxic and abrasive wonder metal. In their temperature-controlled shop, this feather-light gyro float assembly (shown actual size, right) was turned on a special high-precision LeBlond Dual-Drive Lathe. *Spherocity had to be concentric with the two major axes within .0005" total indicated runout of 1.8750"!* (To hold the assembly that close, component tolerances had to be even tighter!)

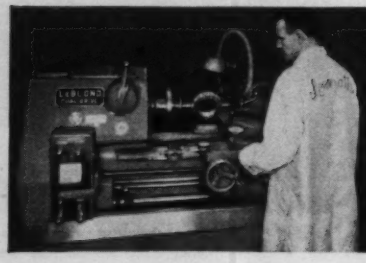
To perform such touchy work, Leemath ordered their LeBlond 15" Dual-Drive to ultra-high precision standards. For this lathe Timken furnished specially-made bearings with one-third the runout of their finest precision class. With it came the standard features that give LeBlond its reputation for long-lived precision —combination gear-belt drive headstock with 16 speeds, 31 to 2400 rpm; compensating vee bed way construction with hardened steel shears; thrust-lock tailstock; and many more.

People buy lathes for many reasons. But when, like Leemath, they must have precision they can depend upon, that is reason enough to buy LeBlond.

If you would like to have the full story of LeBlond's Dual-Drive, ask your distributor or write for Bulletin 6A.



Reason enough to buy LeBlond



THE R. K. LeBLOND MACHINE TOOL COMPANY
Cincinnati 8, Ohio

LeBLOND *of Cincinnati*

No Time for Pessimism!

Many who optimistically predicted that 1960 would automatically usher in the decade of the "Soaring Sixties" have changed their tune.

After plenty of soul searching during the first three months of 1960, they conclude that the decade could be appropriately called the "Sinking Sixties."

The facts do not justify that switch in thinking.

Consumers, with 1960 income at the rate of $395 billion annually, or $25 billion more than a year ago, are showing little disposition to slacken purchases. The U. S. basically has a consumer goods economy.

As another measure, preliminary figures indicate first quarter gross national product was at the record annual rate of $500 billion compared with $480 billion in 1959. For 1960, the figure is expected to be around $506 billion.

As a third measure, the widespread inventory excesses that contributed to the 1957 boom and the subsequent recession in 1958 are largely nonexistent today.

In steel, for example, first quarter production of 34.5 million ingot tons (or at the annual rate of nearly 140 million tons) was unrealistic. The rate is now closer to where it should be.

Of the 24.3 million tons of finished steel taken in by consumers in the first quarter, 20.1 million tons were consumed and the balance of about 4.2 million tons went into inventories.

But with second quarter ingot production down to about 30 million tons, finished steel shipments of 22.5 million tons will exceed consumption by less than 2 million tons.

In the second half, forecasters are confidently predicting ingot production of 57.5 million tons, with finished steel shipments and consumption in close balance at about 41.5 million tons each.

So finished steel shipments of about 88 million tons for the year are likely to exceed consumption by only 6 million tons.

That means inventories on Dec. 31 will be a comfortable 17 million tons vs. the prestrike figure of 26 million in 1959.

Those reliable indicators substantiate the conviction that 1960 will still turn out to be a good year, but not as good as anticipated earlier by the wildly enthusiastic optimists.

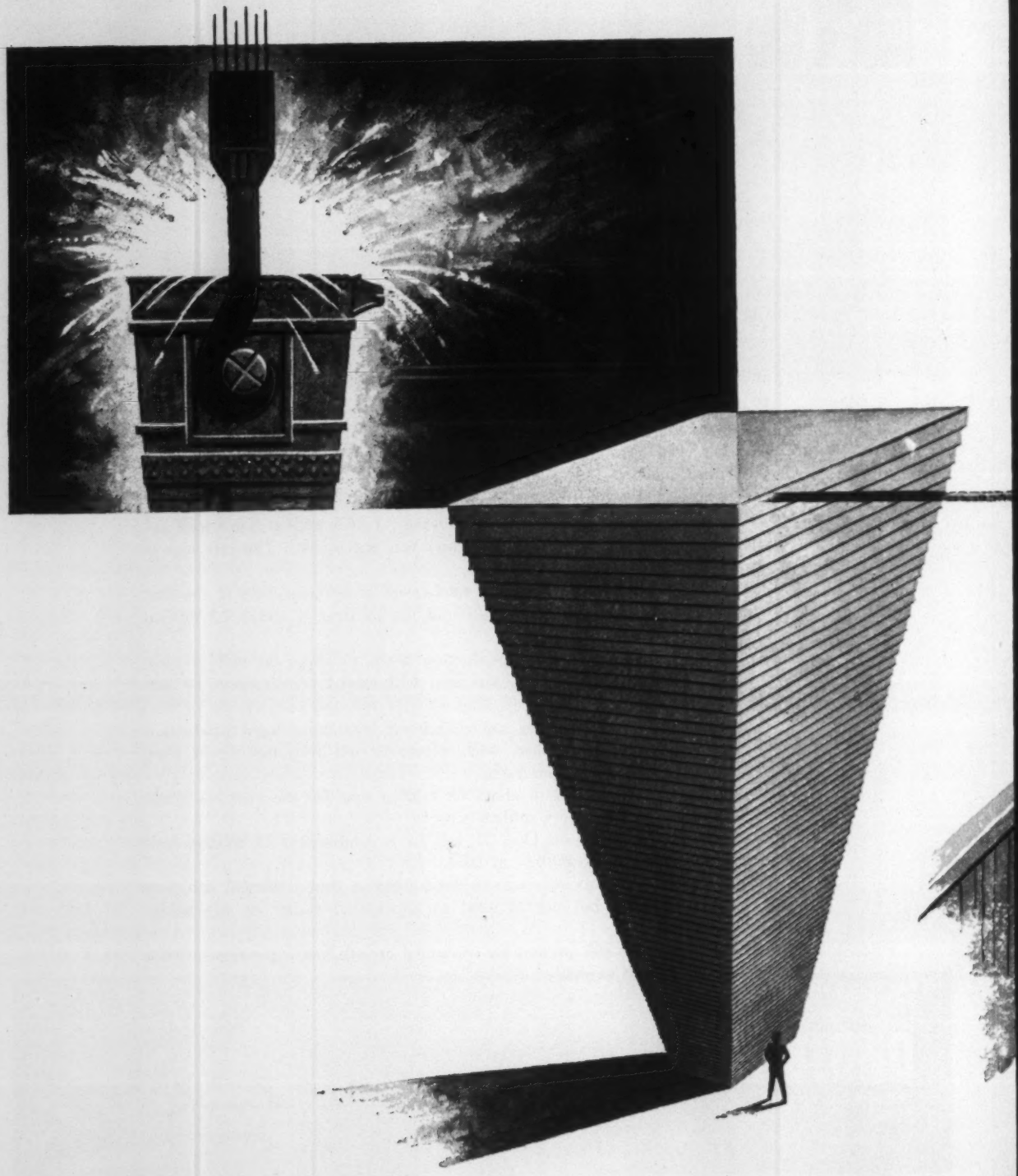
And the factors are still present for continued growth and expansion in what we prefer to call the "Competitive Sixties."

We think it's no time for pessimism!

Irwin H. Such

EDITOR-IN-CHIEF

WHAT IS CF&I

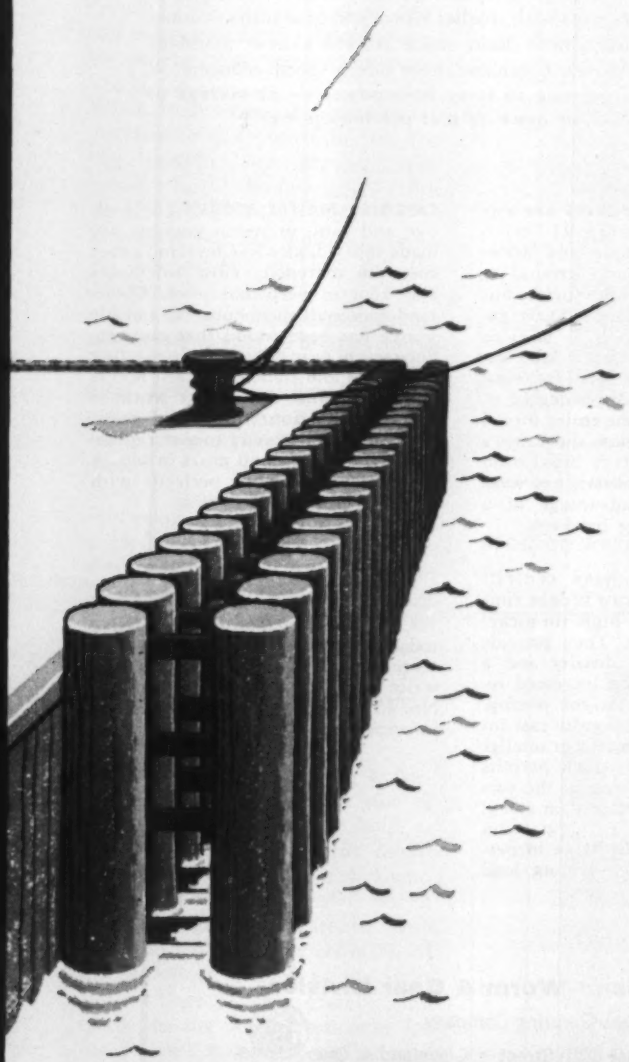


CLAYMONT?

CF&I-Claymont is the heart of a volcano...

a mountain of plates...

a dock on tidewater



Claymont is a vital arm of CF&I, one of the nation's leading steel companies. Claymont is liquid steel, hot as the heart of a volcano, flowing from an open hearth. It is plateau after plateau of steel plates poised for rapid delivery. Claymont is water, highway and railroad shipping facilities that assure rapid, economical shipment of all Claymont products.

Claymont is an integrated steel mill. Here, CF&I's pig iron is converted into quality steel. Then the steel undergoes the constant scrutiny of quality control men as it is rolled into plates and shaped into a wide variety of plate products. The result: built-in dependability which is characteristic of all CF&I steel products.

CF&I-Claymont is also a sales-service force whose job is to serve you properly and promptly, providing you with technical assistance whenever needed.

CLAYMONT STEEL PRODUCTS

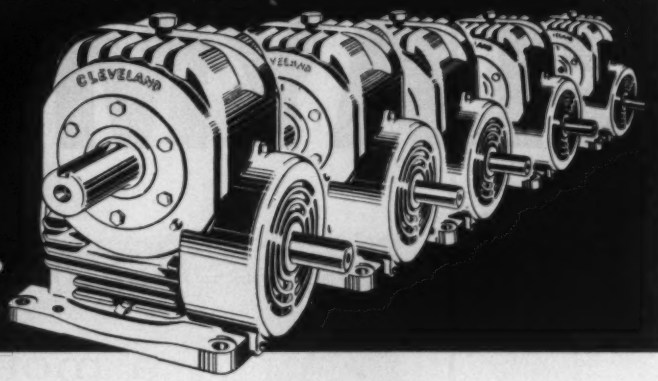
THE COLORADO FUEL AND IRON CORPORATION

DENVER • OAKLAND • NEW YORK

sales offices in all key cities

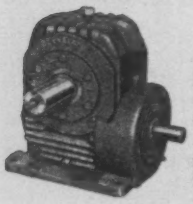
CF&I STEEL

Why do these new Clevelands carry higher horsepower ratings?



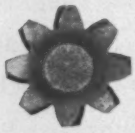
It's because Cleveland design engineers — drawing on 47 years of experience — have successfully blended the *just right* combination of housing design, exclusive heat-treatment for alloy steel worms, centrifugal casting of bronze gear rims together with larger, more rugged taper roller bearings on worm and gear shafts.

This permits substantially higher horsepower ratings with smaller worm and gear units — units that more than meet AGMA's new Standard 440.03. Cleveland now offers speed reducers — from one to forty horsepower — at savings of 50% or more on cost per horsepower.



HOUSING is a rugged one-piece design of highest quality cast iron, ribbed for maximum strength and heat dissipation. Cooling fan of unique design is mounted on *input* end of worm shaft and is equally efficient in either direction of rotation. Only one gear shaft bearing plate is large enough to permit assembly of the gear. On gear shaft extension side, gear shaft bearing is mounted in the housing bore and backed up by a clamping plate. This gives a stronger housing and provides maximum strength for overhung loads. Housings are designed for mounting in one position only, thus avoiding design compromises necessary with *universal mount* types.

BEARINGS on both worm and gear shafts are Timken taper roller-type, providing adequate thrust and radial capacity. Worm bearings are mounted directly in housing bore for greater rigidity.



WORMS are cut integral with shaft and accurately ground to a high surface finish on both thread flanks. Shaft extension diameter is especially large to permit increased overhung load capacity. An exclusive heat-treating technique provides a high degree of hardness throughout the entire thread thickness and well below the worm's root diameter. It gives maximum thread strength and resistance to wear without losing the advantage of a tough core of medium hardness.

GEARS have centrifugally cast bronze rims with a high tin-nickel content. They provide greater density and a higher hardness, giving increased resistance to wear and fatigue pitting. Bronze rims are centrifugally cast integral with cast iron centers, in smaller sizes up to 6 inches, which permits strong mechanical keying of the two parts — without dependence on actual surface bond. Gear shaft extension diameters are especially large to permit greatly increased overhung load capacity.

ORIGINAL MASTER WORMS for each size and ratio of worm gearing, are made individually in Cleveland's tool room to extremely close tolerances and kept in perpetual stock. Cleveland makes all their hobs. No outside source has been found that can produce worm gear hobs to their exacting tolerances and standards. Each hob is checked against this master worm — as are production worms and gears. Thus, it's not necessary to ever replace Cleveland worms and gears in sets. A new gear will operate perfectly with an old worm and vice versa.

Call your Cleveland Representative today, to get all the facts on these new, more powerful speed reducers. Or, write for a copy of new, free Bulletin No. 405 giving complete engineering information.

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Cleveland Worm & Gear Division
Eaton Manufacturing Company
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Economists Predict Business Upturn

STEEL's new Panel of Economic Consultants sees restoration of business confidence

"BUSINESS LEADERS vied for optimistic adjectives to describe the decade of the sixties in their year-end pronouncements. People began to believe that something magic would happen on Jan. 1, 1960. When only normal increases in business were reported in the first two months, our superoptimism cooled. But if the forecasts (of this panel) are attained, 1960 will be in general our best business year—not dramatically so, but still the best ever."

That is one of the nation's top economists talking. He sums up the attitude of 44 of his colleagues who form STEEL's new Panel of Economic Consultants. (They are listed on Page 93.) In this first report of a new survey to help metalworking managers make better business plans, the consultants forecast a moderate expansion in the nation's economy well into next year. This one will be "a high level year of rolling adjustments—similar in some ways to 1956," in the words of Joseph K. Heyman, senior vice president of the Trust Co. of Georgia, Atlanta.

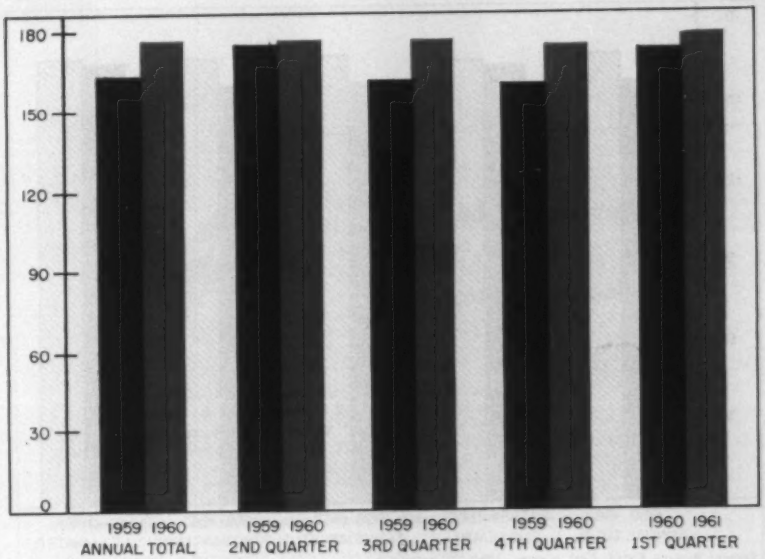
• **While the overwhelming majority of the panel is on the side of cautious optimism, a few hold to the view that the economy might be in the early stages of a shakeout.**

The fact that the panel is not in complete agreement can be seen from the high and low estimates of the indicators charted at the right and on Page 92. For example, the spread in the annual estimates for the Federal Reserve Board's index of durable goods manufacturing is only 18 points. It widens progressively to 46 points by the first quarter of 1961.

In the matter of expenditures for

Median Estimates for FRB Durable Goods Index

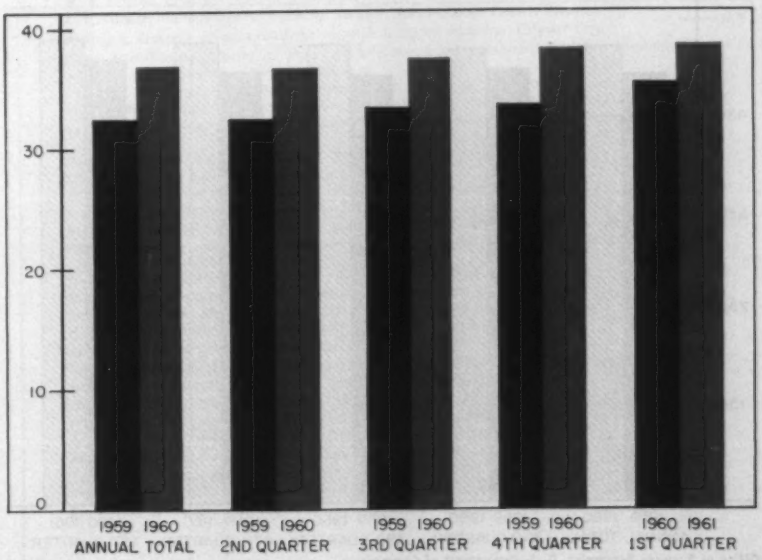
(1947-49 = 100, revised)



Federal Reserve Board. First quarter, 1960, estimated by STEEL.

Median Estimates for Plant & Equipment Expenditures

(Annual rate, seasonally adjusted, billions of dollars)



Securities & Exchange Commission.

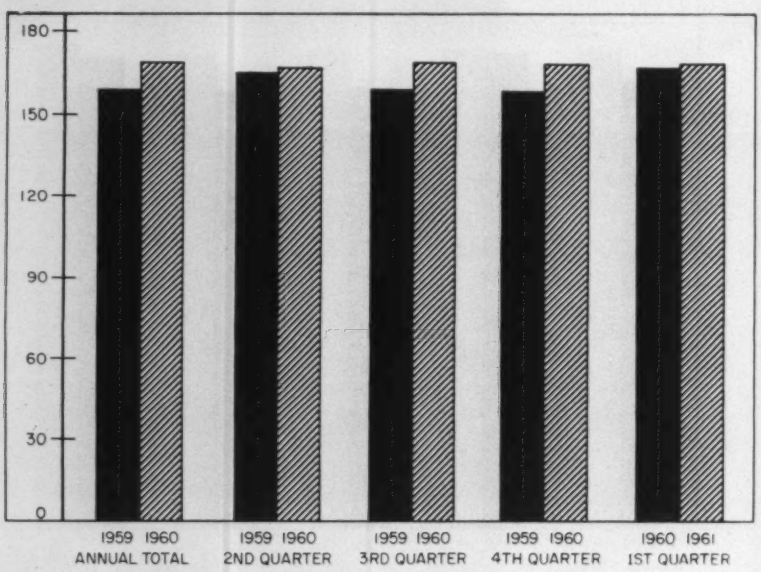
plant and equipment, the economists are undoubtedly influenced by the recent Department of Commerce report on businessmen's expectations. But even though the panel's median (see Page 91) is almost exactly the same as Commerce's estimate for 1960 ($37.016 billion), the spread runs all the way from $35 billion to $38 billion.

• Nor do the economists, as a panel or individually, see the uptrend as being uniform for all segments of the economy during 1960.

While they predict a continual rise in the gross national product throughout the next four quarters (see graph at left), they look for a leveling off of the total industrial production index in the second half of this year. They also feel that metalworking (as indicated by the durable goods index charted on Page 91) will turn down slightly starting in the fourth quarter.

Median Estimates for Total FRB Index

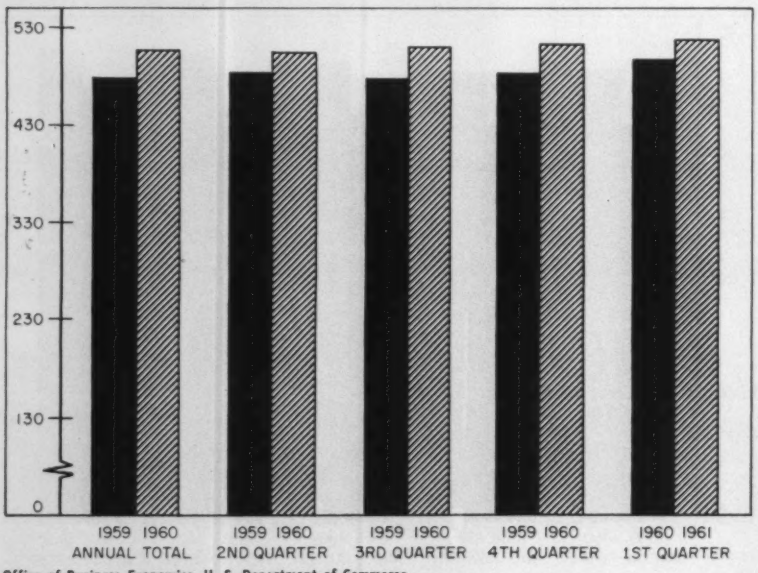
(1947-49 = 100, revised)



Federal Reserve Board. First quarter, 1960 estimated.

Median Estimates for GNP

(Annual rate, seasonally adjusted, billions of dollars)



Office of Business Economics, U. S. Department of Commerce.
First quarter, 1960 estimated by STEEL.

• In addition to the four barometers charted, the economists predict a good year for steel production, passenger car output, new construction expenditures, and housing starts.

Despite the current cutbacks in the steel operating rate, STEEL's consultants look for an all-time high output of 122 million tons of steel for ingots and castings in 1960. They expect second quarter output to total about 32 million tons; third quarter, 28 million tons; fourth quarter, 29 million tons; and first quarter of 1961, 28 million. Output in the first quarter of this year was about 34.7 million tons. (The quarterly estimates do not add up to the yearly total because they are median figures.)

The forecasters are still fairly optimistic about car sales this year, based mostly on an expected upturn now that the weather has improved. The median estimate for production is 6.5 million units, with a high of 6.9 million and a low of 6 million. If the prediction comes true, this will be the third best year in history (next to 1957 and 1950).

New construction expenditures this year may set a record. The panel predicts a total of $55 billion compared with $54.3 billion last year. But housing starts will be no better than 1.2 million units if the median is correct. However, several members of the panel stress that residential building might well be stronger than most people think now.

• Most of our consultants, regardless of the direction they see for business over the rest of the year, feel that the pessimism which has crept into business thinking lately is ill-founded.

Many believe that the lack of optimism stems from too much of it following the steel strike. Most goals were set too high. "Although business activity generally is above the level of a year ago and above

last year's average, apparently businessmen expected more," suggests Ira T. Ellis, economist for E. I. du Pont de Nemours & Co. The fact that business has not been extreme "can be regarded as a favorable factor over the intermediate term," declares B. J. Korb, manager of market and economic research for Koppers Co. Inc.

Others think that today's business mood is tied too much to the stock market. Many agree with Arthur Rosenbaum, manager of economic research for Sears, Roebuck & Co., who says: "The decline in the stock market . . . has been no more than a healthy correction in values of common stocks which had become overpriced in relation to earnings and to the bond market."

In addition to those two factors, the panelists attribute most of the decline in optimism to bad weather, which accentuated the normal seasonal downturn, and to the more conservative inventory policies of businessmen.

• "The lack of optimism is a short run attitude," declares Edward L. Cushman, vice president of American Motors Corp. And most of his colleagues agree with him. And they do not think it will endanger the chances of this being a good year.

In fact, Mr. Rosenbaum does not believe there is "justification for saying that we are suffering from a lack of optimism." He points to the latest surveys of both consumer and business spending plans as evidence that both of these major segments of the economy are bullish. Adds John J. Balles, vice president and economist for the Mellon National Bank in Pittsburgh: "Since the degree of confidence usually follows rather than precedes a turn in business, it is likely that the spring pickup will repair the recent damage to business psychology."

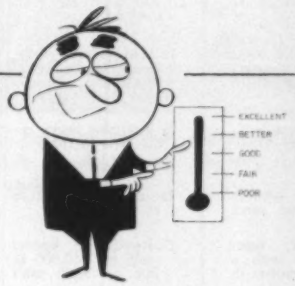
• While the economists do not completely discount the possibility of a recession in the near future (several predict a mild one for 1961), they feel the moderation of optimism lessens the chances of one.

"Unless people get panicky," says one Midwest panel member, "this is all to the good because we have avoided what might have been a dangerous speculative blowoff."

In fact, the consensus is that the 1960s will be not too much different from the 1950s. States Dr. Murray L. Weidenbaum, economist for Boeing Airplane Co.: "The 1960s will not be 'sizzling' or 'soaring' but a period of great over-all expansion. Individual periods of decline will in all probability continue to occur."

This is the first in a series of semi-annual business forecast surveys. The members of STEEL's Panel of Economic Consultants will submit their estimates of future business conditions every spring and fall, the times when metalworking managers need this information most. The next survey will appear in the Oct. 3 issue of STEEL.

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.



The editors present STEEL's panel of economic consultants

A. G. Abramson, director of economic planning, SKF Industries Inc.
John T. Anderson, manager, Commercial Research Dept., Armco Steel Corp.
Miner H. Baker, vice president & economist, Seattle-First National Bank.
John J. Balles, vice president & economist, Mellon National Bank & Trust Co., Pittsburgh.
Edward S. Bigelow, economist, Minneapolis-Honeywell Regulator Co.
Ingersoll D. Bruner, economics research analyst, Carrier Corp.
William F. Butler, vice president, Chase Manhattan Bank, New York.
William P. Carlin, assistant manager, commercial research, Republic Steel Corp.
George W. Coleman, economist, Mercantile Trust Co., St. Louis.
Robert Coltman, vice president, Philadelphia National Bank.
Edward L. Cushman, vice president, American Motors Corp.
James M. Dawson, vice president & economist, National City Bank of Cleveland.
Louis S. Drake, manager, economic research, Calumet & Hecla Inc.
David C. Elliott, vice president, Cleveland Trust Co.
Ira T. Ellis, economist, E. I. du Pont de Nemours & Co.
B. E. Etcheverry, director of general planning, Kaiser Steel Corp.
Richard W. Everett, assistant manager, sales control, Continental Can Co. Inc.
W. H. Finigan, director, marketing research, National Cash Register Co.
A. C. Fischer, regional market planning manager, Westinghouse Electric Corp.
William C. Flaherty, director, business research & market planning, Chrysler Corp.
Curry W. Gillmore, director of statistics & economics, International Business Machines Corp.
Borden Helmer, economist, Union Carbide Corp.
Joseph K. Heyman, senior vice president, Trust Co. of Georgia, Atlanta.
William Dudley James, product manager, Ophthalmic Div., Bausch & Lomb Optical Co.
C. C. Jamison, vice president & manager, Research Dept., Security First National Bank, Los Angeles.
Norris O. Johnson, vice president, First National City Bank of New York.
Lester S. Kellogg, director of economic research, Deere & Co.
Edmund R. King, assistant treasurer & chief statistician, Eastman Kodak Co.
B. J. Korb, manager, market & economic research, Koppers Co. Inc.
Herbert A. Leggett, vice president & economist, Valley National Bank, Phoenix, Ariz.
Harry Leopold Jr., director of commercial research, John A. Roebling's Sons Div., Colorado Fuel & Iron Corp.
Irving Lipkowitz, director of economic affairs, Reynolds Metals Co.
C. W. Mackay, manager, Business Research Dept., Anaconda Co.
Stanley V. Malcuit, staff economist, Aluminum Co. of America.
H. C. Micoleau, economist, financial staff, General Motors Corp.
James L. Rich, assistant director of commercial research, U. S. Steel Corp.
Nathaniel H. Rogg, director, Economics Department, National Association of Home Builders.
Arthur Rosenbaum, manager-economic research, Sears, Roebuck & Co.
W. E. Rothfelder, manager, Commercial Research Div., Inland Steel Co.
Arthur A. Smith, vice president & economist, First National Bank, Dallas.
A. Howard Smith, manager, Commercial Research Dept., Jeffrey Mfg. Co.
Beryl W. Sprinkel, economist, Harris Trust & Savings Bank, Chicago.
Benjamin F. Stacey, vice president, First National Bank of Boston.
Robert W. Storer, vice president, Manufacturers National Bank of Detroit.
Dr. Murray L. Weidenbaum, economist, Boeing Airplane Co.

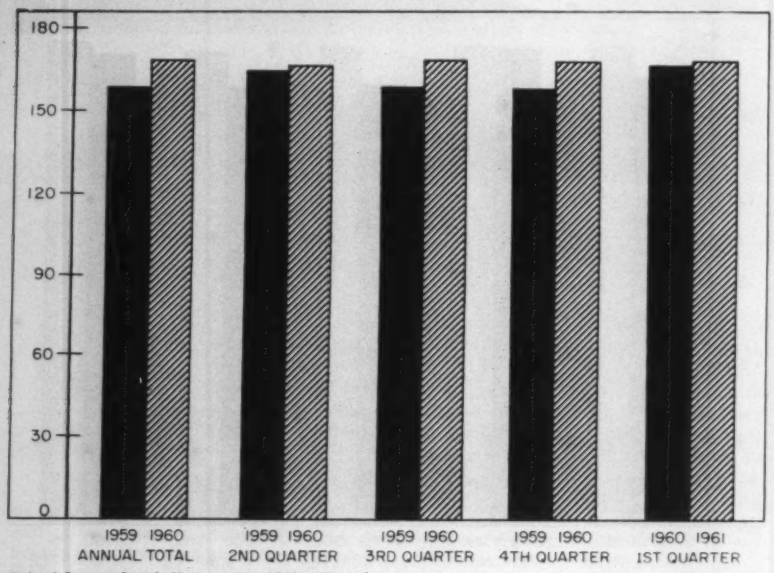
plant and equipment, the economists are undoubtedly influenced by the recent Department of Commerce report on businessmen's expectations. But even though the panel's median (see Page 91) is almost exactly the same as Commerce's estimate for 1960 ($37.016 billion), the spread runs all the way from $35 billion to $38 billion.

• Nor do the economists, as a panel or individually, see the uptrend as being uniform for all segments of the economy during 1960.

While they predict a continual rise in the gross national product throughout the next four quarters (see graph at left), they look for a leveling off of the total industrial production index in the second half of this year. They also feel that metalworking (as indicated by the durable goods index charted on Page 91) will turn down slightly starting in the fourth quarter.

Median Estimates for Total FRB Index

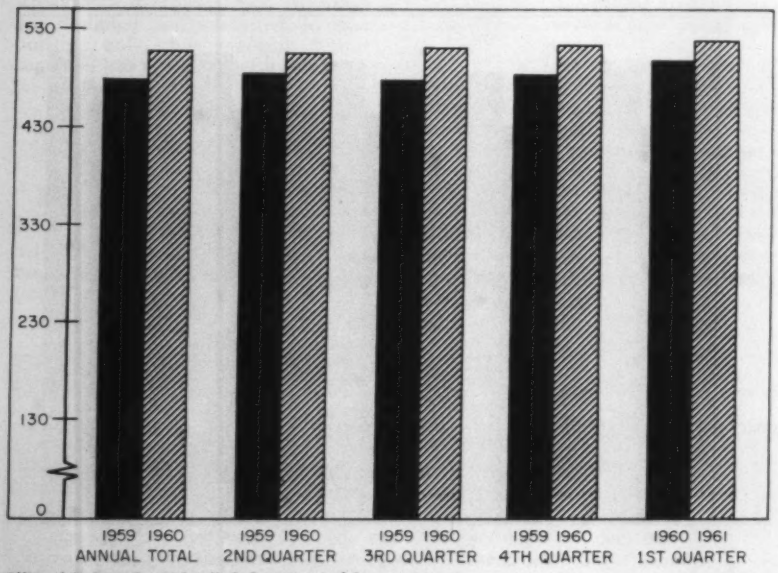
(1947-49 = 100, revised)



Federal Reserve Board. First quarter, 1960 estimated.

Median Estimates for GNP

(Annual rate, seasonally adjusted, billions of dollars)



Office of Business Economics, U. S. Department of Commerce.
First quarter, 1960 estimated by STEEL.

• In addition to the four barometers charted, the economists predict a good year for steel production, passenger car output, new construction expenditures, and housing starts.

Despite the current cutbacks in the steel operating rate, STEEL's consultants look for an all-time high output of 122 million tons of steel for ingots and castings in 1960. They expect second quarter output to total about 32 million tons; third quarter, 28 million tons; fourth quarter, 29 million tons; and first quarter of 1961, 28 million. Output in the first quarter of this year was about 34.7 million tons. (The quarterly estimates do not add up to the yearly total because they are median figures.)

The forecasters are still fairly optimistic about car sales this year, based mostly on an expected upturn now that the weather has improved. The median estimate for production is 6.5 million units, with a high of 6.9 million and a low of 6 million. If the prediction comes true, this will be the third best year in history (next to 1957 and 1950).

New construction expenditures this year may set a record. The panel predicts a total of $55 billion compared with $54.3 billion last year. But housing starts will be no better than 1.2 million units if the median is correct. However, several members of the panel stress that residential building might well be stronger than most people think now.

• Most of our consultants, regardless of the direction they see for business over the rest of the year, feel that the pessimism which has crept into business thinking lately is ill-founded.

Many believe that the lack of optimism stems from too much of it following the steel strike. Most goals were set too high. "Although business activity generally is above the level of a year ago and above

last year's average, apparently businessmen expected more," suggests Ira T. Ellis, economist for E. I. du Pont de Nemours & Co. The fact that business has not been extreme "can be regarded as a favorable factor over the intermediate term," declares B. J. Korb, manager of market and economic research for Koppers Co. Inc.

Others think that today's business mood is tied too much to the stock market. Many agree with Arthur Rosenbaum, manager of economic research for Sears, Roebuck & Co., who says: "The decline in the stock market . . . has been no more than a healthy correction in values of common stocks which had become overpriced in relation to earnings and to the bond market."

In addition to those two factors, the panelists attribute most of the decline in optimism to bad weather, which accentuated the normal seasonal downturn, and to the more conservative inventory policies of businessmen.

• "The lack of optimism is a short run attitude," declares Edward L. Cushman, vice president of American Motors Corp. And most of his colleagues agree with him. And they do not think it will endanger the chances of this being a good year.

In fact, Mr. Rosenbaum does not believe there is "justification for saying that we are suffering from a lack of optimism." He points to the latest surveys of both consumer and business spending plans as evidence that both of these major segments of the economy are bullish. Adds John J. Balles, vice president and economist for the Mellon National Bank in Pittsburgh: "Since the degree of confidence usually follows rather than precedes a turn in business, it is likely that the spring pickup will repair the recent damage to business psychology."

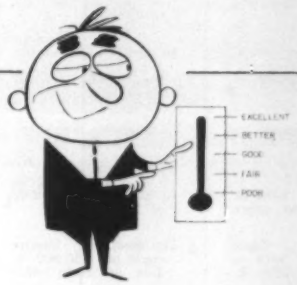
• While the economists do not completely discount the possibility of a recession in the near future (several predict a mild one for 1961), they feel the moderation of optimism lessens the chances of one.

"Unless people get panicky," says one Midwest panel member, "this is all to the good because we have avoided what might have been a dangerous speculative blowoff."

In fact, the consensus is that the 1960s will be not too much different from the 1950s. States Dr. Murray L. Weidenbaum, economist for Boeing Airplane Co.: "The 1960s will not be 'sizzling' or 'soaring' but a period of great over-all expansion. Individual periods of decline will in all probability continue to occur."

This is the first in a series of semi-annual business forecast surveys. The members of STEEL's Panel of Economic Consultants will submit their estimates of future business conditions every spring and fall, the times when metalworking managers need this information most. The next survey will appear in the Oct. 3 issue of STEEL.

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.



The editors present STEEL's panel of economic consultants

A. G. Abramson, director of economic planning, SKF Industries Inc.
John T. Anderson, manager, Commercial Research Dept., Armco Steel Corp.
Miner H. Baker, vice president & economist, Seattle-First National Bank.
John J. Balles, vice president & economist, Mellon National Bank & Trust Co., Pittsburgh.
Edward S. Bigelow, economist, Minneapolis-Honeywell Regulator Co.
Ingersoll D. Bruner, economics research analyst, Carrier Corp.
William F. Butler, vice president, Chase Manhattan Bank, New York.
William P. Carlin, assistant manager, commercial research, Republic Steel Corp.
George W. Coleman, economist, Mercantile Trust Co., St. Louis.
Robert Coltman, vice president, Philadelphia National Bank.
Edward L. Cushman, vice president, American Motors Corp.
James M. Dawson, vice president & economist, National City Bank of Cleveland.
Louis S. Drake, manager, economic research, Calumet & Hecla Inc.
David C. Elliott, vice president, Cleveland Trust Co.
Ira T. Ellis, economist, E. I. du Pont de Nemours & Co.
B. E. Etcheverry, director of general planning, Kaiser Steel Corp.
Richard W. Everett, assistant manager, sales control, Continental Can Co. Inc.
W. H. Finigan, director, marketing research, National Cash Register Co.
A. C. Fischer, regional market planning manager, Westinghouse Electric Corp.
William C. Flaherty, director, business research & market planning, Chrysler Corp.
Curry W. Gillmore, director of statistics & economics, International Business Machines Corp.
Borden Helmer, economist, Union Carbide Corp.
Joseph K. Heyman, senior vice president, Trust Co. of Georgia, Atlanta.
William Dudley James, product manager, Ophthalmic Div., Bausch & Lomb Optical Co.
C. C. Jamison, vice president & manager, Research Dept., Security First National Bank, Los Angeles.
Norris O. Johnson, vice president, First National City Bank of New York.
Lester S. Kellogg, director of economic research, Deere & Co.
Edmund R. King, assistant treasurer & chief statistician, Eastman Kodak Co.
B. J. Korb, manager, market & economic research, Koppers Co. Inc.
Herbert A. Leggett, vice president & economist, Valley National Bank, Phoenix, Ariz.
Harry Leopold Jr., director of commercial research, John A. Roebling's Sons Div., Colorado Fuel & Iron Corp.
Irving Lipkowitz, director of economic affairs, Reynolds Metals Co.
C. W. Mackay, manager, Business Research Dept., Anaconda Co.
Stanley V. Malcuit, staff economist, Aluminum Co. of America.
H. C. Micoleau, economist, financial staff, General Motors Corp.
James L. Rich, assistant director of commercial research, U. S. Steel Corp.
Nathaniel H. Rogg, director, Economics Department, National Association of Home Builders.
Arthur Rosenbaum, manager-economic research, Sears, Roebuck & Co.
W. E. Rothfelder, manager, Commercial Research Div., Inland Steel Co.
Arthur A. Smith, vice president & economist, First National Bank, Dallas.
A. Howard Smith, manager, Commercial Research Dept., Jeffrey Mfg. Co.
Beryl W. Sprinkel, economist, Harris Trust & Savings Bank, Chicago.
Benjamin F. Stacey, vice president, First National Bank of Boston.
Robert W. Storer, vice president, Manufacturers National Bank of Detroit.
Dr. Murray L. Weidenbaum, economist, Boeing Airplane Co.

Space Timetable: The Projects, Who's Involved

Vehicle or program	Description	Principal Function	Status	Principal Contractors
SCOUT	Four stage, solid fueled rocket	To launch 200 lb payloads into 300 mile high earth orbits	Operational by mid-1960	Aerojet-General, Thiokol, Allegheny Ballistics Laboratory, Minneapolis-Honeywell, Chance Vought
DELTA	Three stage, modified Thor-Able	To launch 300 lb payloads into 1000 mile high earth orbits; send 65 lb payload to the moon	To be used from 1960 through 1962	Douglas, Aerojet, Allegheny Ballistics Laboratory
CENTAUR	First stage is modified Atlas; second stage is new liquid hydrogen engine	To launch fixed communications satellite into 22,000 mile high earth orbit	Six missions scheduled to begin in mid-1961	Convair, Pratt & Whitney
SATURN	Eight Jupiter/Thor type engines clustered to give 1.5 million lb of thrust	To land payloads on the moon; launch satellites and manned space laboratories	1963-1965?	North American (second stage to be announced)
MERCURY	Manned space capsule to be launched by Atlas	To determine man's capabilities in space	A Redstone test launching may be tried in 1960	McDonnell Aircraft
X-15	Transition craft between atmosphere and space	To achieve an altitude of 250,000 ft	Flown in 1959 to 50,000 ft	North American
F-1	Single chamber, liquid fueled engine with a thrust of 1.5 million lb	Clustered, a booster could put 150,000 lb into an earth orbit	Under development	North American
ROVER	Nuclear engine for space flight (Kiwi-A is a test reactor)	To take over after a vehicle has reached space	Ready by 1967-1969?	Atomic Energy Commission, Lockheed
ECHO	Aluminized Mylar spheres in an earth orbit	Signals will be bounced off	Three will be launched from 1960 to 1962	American Telephone & Telegraph
TIROS	Cameras in an earth orbit	Meteorological investigation	1960-1961?	Radio Corp. of America

Space Marketing Opportunities Grow

NEW MARKETS for metalworking are being developed so fast at the National Aeronautics & Space Administration that many companies will soon find it necessary to give that agency special attention.

All the new technologies are involved in spacework, including thermoelectronics, ion propulsion, solar energy applications, and the use of plasma jets.

• **Getting Acquainted**—The salient feature of the agency's procurement and contracting organization is its system of decentralized operation: Except for basic research grants, the bulk of contracts is awarded and administered outside the Washington headquarters. Up to 80 per cent of the agency's work is contracted out to private industry, says Ernest W. Brackett, director, procurement and supply division. Fiscal 1961 authorizations from Congress to the agency exceed $900 million. That budget should double easily in two years.

The agency has three main divisions: Office of Advanced Research Programs (aeronautical and space research); Office of Space Flight Programs (mission planning, payload design and development, and in-flight research and operation); and Office of Launch Vehicle Programs (booster development and launching).

The field installations which do most of the contracting are:

1. Langley Research Center, Hampton, Va.—research in aerodynamics, fluid mechanics, stability and control, vibration and flutter, loads, structures, materials, and inflatable satellites, vertical and short take-off and landing aircraft, and ground cushion machines.

2. Ames Research Center, Moffett Field, Calif.—attitude control systems, optical error sensors, power supplies for orbiting observatories, re-entry heating, and high speed aerodynamics.

3. Lewis Research Center, Cleveland—electrical and nuclear propulsion, high temperature materials,

and rocket fuels.

4. Flight Research Center, Edwards, Calif.—aircraft flight, including the X-15.

5. Goddard Space Flight Center, Greenbelt, Md.—manned satellites, rocket astronomy, Delta, and Mercury.

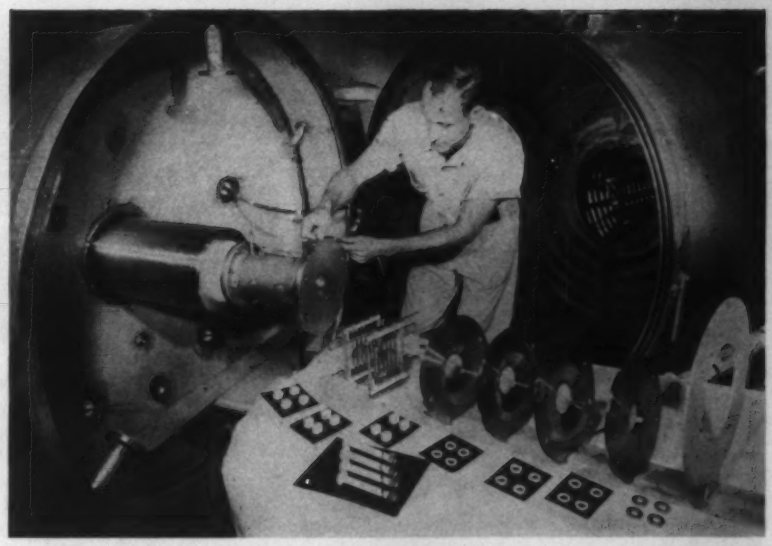
6. Jet Propulsion Laboratory, Pasadena, Calif.—lunar and interplanetary programs, physics, gas dynamics, propulsion, materials, and electronics.

• **Small Business Activities** — Supplies, equipment, services, and construction are usually procured through formal advertisement; fixed price contracts are awarded. Research and development contracts are negotiated.

Procurement instructions issued by the agency's headquarters provide for screening of all proposed purchases and contracts over $2500 by small business specialists at the field installations. In six months last year (Apr. 1 through Sept. 30), about $16.2 million went to small firms. Unclassified publications issued by the agency may be purchased by anyone. Annual tours for industry are conducted at Langley.

• **Problem Areas** — Increased reliability and larger payloads are the two big problems the agency faces in the immediate future. That is why so few of the agency's vehicles are new; most are modified versions of Defense Department missiles. The longer the agency works with a rocket, the more reliable it becomes. Space vehicles are another matter. There, the agency is starting from scratch so it must conduct all sorts of basic studies in dozens of metalworking fields.

• **Materials Research**—In this field, the agency is looking at the high and low temperature properties of metals, plastics, and ceramics; oxidation resistant coatings for metals; deterioration of materials under ultraviolet radiation or in a vacuum; the permeability of materials to air; and the effects of strain on the properties and stability of metals. It seeks special purpose materials for energy conversion, and components like nuclear fuel elements, bearings, and elastomers.



These are parts of an ion engine being assembled for testing. Powered by cesium, such an engine will operate in space after being launched by a conventional rocket

Fiber metallurgy is an important project at Lewis Research. The center reports metals or ceramics exhibit "incredible" strength when they are made with little or no crystal structure imperfections. For example, metal fibers with diameters of 0.0001 in. or less growing out of bits of metal under heavy electronic bombardment have tensile strengths of 2 million psi.

• **Cryogenics** — This new field is opening up fast. The use of cryogenic (low temperature) propellents, like liquid hydrogen and fluorine, poses special problems in tank design. Little is known about the properties of high strength materials at low temperatures. Tensile tests are being run on sheet metal at $-423°$ F; materials which act the best include austenitic stainless steel and alloys based on nickel, aluminum, and titanium. To insulate the tanks, the agency appears to lean toward foamed-in-place plastics.

• **Motor Cases**—Improved steels are needed badly for solid propellent cases. Light, high strength steels are subject to catastrophic failure far below the design stresses, because of flaws in the welds (which are almost impossible to avoid).

Refractory metals are coming into their own at the agency's research centers which concentrate on the heating problems space vehicles face.

Whether the vehicle structure is cooled or not, refractory metals like molybdenum, columbium, and tungsten are likely to show up either in the primary structure or the heat shield, which protects the vehicle upon re-entry into the atmosphere. Resistance welded molybdenum alloy sandwich construction has proved successful to the extent that tests to 3000° F showed strength close to that of molybdenum itself. Coatings are being sought to protect the leading edges of the vehicle.

The problems cited barely hint at the opportunities for wide-awake firms with the capability to move into the space field. The agency's standing policy is to listen to anyone who has a well thought out idea for solving any of its many problems. The fact that the contracting is done at field installations gives the potential contractor a better opportunity to get close to the personnel most familiar with the subject he is interested in.

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Baltimore & Ohio Railroad

General Freight Car Shortage Unlikely

Most railroad cars will be in adequate supply, but shortages will be encountered in:

- **Hopper cars**
- **Long gondola cars**
- **Double door 40 and 50 ft boxcars**

DON'T look for a general freight car shortage to develop this year, despite earlier fears that shipping requirements would exceed equipment availability. However, supply of some special types of cars will continue to be short.

The pessimistic outlook for 1960 was based on an expected boom in industrial activity. But the level of business will fall somewhat below projections, resulting in fewer carloadings. The equipment situation is also more favorable. On Mar. 1, 92.5 per cent of the 1,675,313 cars owned were serviceable compared with 90.8 per cent of 1,721,800 cars in 1959. Deliveries of new cars are rising and turnarounds are faster.

• **Shortages Spotted** — Hopper cars will be the No. 1 problem, says C. D. Buford, vice president, Operations & Maintenance Dept., Association of American Railroads. Early opening of Great Lakes shipping, movement of iron ore in ground storage and coal to the lakes will require every serviceable hopper car.

Demand for gondola cars is also expected to be heavy as a result of the high level of steel production. To relieve the shortage of long cars, it is urged that 61 to 65 ft gondolas not be used for bulk commodities. Using special types of cars for hauling improper cargo is a major rail problem, for it makes such cars unavailable for hauling the products for which they were designed.

Mr. Buford points out that supply of special types of boxcars has continually been short, even during the recent period of boxcar surplus. Double door, 40 and 50 ft cars of all types are now scarce and will continue to be tight despite the installation of 55,000 units over the last four years.

• **Why a Shortage?** — Financial anemia of the railroads is cited as the principal cause of the dwindling size of the nation's rail car fleet. Coupled with this is the high cost of purchasing and financing new equipment and the continued erosion of traffic to other forms of transportation.

Although the present freight car fleet may be able to handle 1960 traffic without much strain, railroad leaders sound a warning that the country faces a problem of having sufficient cars to meet future peacetime transportation needs and possible national emergency demands. They believe the solution lies in making more investment funds available out of present revenues and bringing additional money into the industry through expanded business.

Colson Salesmen Sell First, Train Later

"Some problems are created," admits D. F. Adams, vice president of sales. "But the system makes salesmen better prepared for formal training, so that the things they'll see and hear will be more meaningful."

NEW SALESMEN at Colson Corp. go into the field for three to six months, then to school.

Why the switch from conventional training procedure?

The company thinks that new salesmen get more out of formal training when they can see how it squares with experience, explains D. F. Adams, vice president of sales. He also admits that the approach has a negative side: Trainees in the field run into situations and problems they can't handle.

Here's how the program works. The new men are given a short indoctrination by district supervisors before going into the field. They make calls with regular territory salesmen. After their baptism of fire, they attend three schools.

One is at Elyria, Ohio, where the company makes hospital equipment and nonpowered trucks; another is at Jonesboro, Ark., the caster manufacturing division; the third is in Somerville, Mass., where powered, vertical lifting equipment is built.

Sessions at each school last three to four days; salesmen attend only one school per month.

• **Mr. Adams considers the separation of training into three periods the key to success.**

"The salesmen are not required to assimilate information on three lines of products at one time. They have nearly a month between classes to put to practical use what they have learned," he explains.

On the road, the men develop selling techniques. At school they gain product knowledge.

Here's what a typical schooling period is like. Purchasing agents tell them what they like and dislike about the salesmen who call on them. Accounting personnel relate what goes on in the office after a sale is made. Production control people discuss problems in manufacturing that may arise in filling and delivering an order.

During a plant tour, they observe "sins of material handling" that they can expect to see in plants they may be selling to. Bad practices are "planted" to test awareness. After the tour, trainees return to a seminar room where they are questioned about what they saw, what remedies they would suggest, and why they would suggest such a solution.

The next step: A seminar which gives trainees the opportunity to bring up experiences in the field. A discussion of remedies (via questions and answers) follows. After teaching is completed, the trainees are given written exams.

• **The Cost**—Mr. Adams estimates that the program costs the company $30,000 a year. To check results, he measured sales in the three months preceding a course, allowed three months for the course, then measured performance in the next three month period. He also allowed for the national average increase resulting from the economic trend.

"Taking those factors into consideration, we find that of 20 men trained, there was an average increase of 15 per cent in sales volume. Since that is a relatively short period for the men to employ their newly acquired knowledge, we feel that the figure will improve greatly."

Sahara Iron Ore Project Gets World Bank Loan

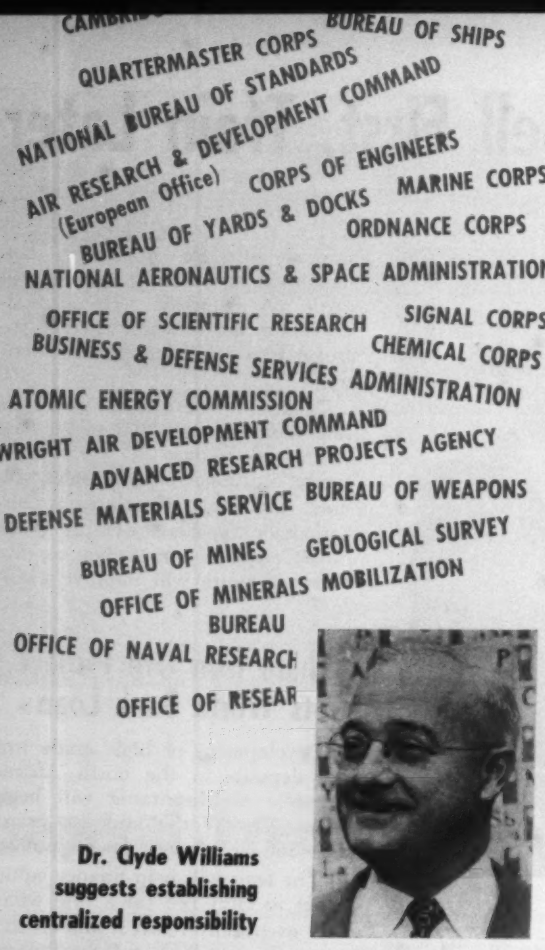
Development of high grade iron ore deposits in the north African republic of Mauritania will begin soon. The World Bank has granted a $66 million loan for the project.

The loan will help finance equipment to mine ore (at a rate which will eventually reach 6 million tons a year) as well as a 415 mile railroad to carry the ore from the mines to the African Atlantic coast and port facilities at Port Etienne. The loan was made to a Mauritanian company (Miferma), which is owned jointly by the French government, French financial and iron and steel interests.

The deposits are in a mountain range on the Sahara plain, near Ft. Gouraud. Open pit reserves are estimated at about 115 million tons, with an average shipping grade of 63 per cent; the ore is similar to high grade Swedish and South American ores.

Ore will be transported across open desert in radio controlled trains to the new port facilities. Storage will be provided for stockpiling about 650,000 tons of ore so shipments can be maintained in the four hottest months of the year when mining operations will be cut 50 per cent.

Construction of the railroad is expected to require about four years, although mining will be started in about two years to build up a shipping stockpile.



Dr. Clyde Williams suggests establishing centralized responsibility

Material Research in Maze, Needs Better Co-ordination

THE MAZE of material research agencies supported by the federal government (see above) is getting nowhere fast, charges Dr. Clyde Williams, president, Clyde Williams & Co., and former director, Battelle Memorial Institute, Columbus, Ohio.

Dr. Williams, acting as chairman of the National Academy of Sciences-National Research Council's Committee on Materials Research, has authored a report which minces no words in evaluating the state of material research.

He wants some sort of "centralized responsibility" which will allow the many government agencies to cooperate with each other and maintain effective liaison with private industry. "Our committee has concluded that the major end item programs in all areas of national security (defense, atomic energy, and space) are now up against a serious material roadblock," says Dr. Williams. Congress' Defense Production Committee came to a similar conclusion earlier this year: Advanced space vehicles are on the drawing boards, but the materials needed to implement the designs are lacking.

Dr. Williams adds: "The need for new and improved materials crosses all service and agency boundaries, and it comes up every day in many ways in every important security program . . . most presently available materials are inadequate for the high temperature end items that must withstand severe temperature, pressure, radiation, corrosion, and stress."

Advanced Research: A Government Job?

Dr. Williams' report makes a strong case for government taking the lead in material research: "Only limited quantities of materials are required for the most highly specialized missiles, satellites, and reactors. Accordingly, our conventional material supplying industries cannot be expected to invest their own money and time in major efforts to develop superproperty materials for defense purposes without proper arrangements to cover associated research and development and facilities costs."

Dr. Williams' concept of a supermaterial agency or co-ordinating committee will probably meet resistance. Several of the agencies involved are extremely jealous of their independent research. When queried about overlapping projects or lack of direction in their programs, they hotly replied that within their own areas they felt they were doing a competent job.

STEEL has reported before that end item contractors do at least two times more material research than the Defense Department's Office of Research & Engineering Materials Co-ordinating Program. For example (STEEL, Aug. 31, 1959, p. 36), Dr. Williams points out, and the Pentagon agrees, that the work is not any part of a nationally organized effort; so results may tend to be lost in proprietary achievements, or get tangled up in Pentagon red tape.

Dissemination of Information

It cannot be denied that certain steps are being taken to solve our material problems. For example, the Army has about $200,000 to establish a technical evaluation center for plastics at Picatinny Arsenal, Dover, N. J. It will operate in the same manner as the Defense Materials Information Center at Battelle.

Dr. Williams hopes to accomplish the same thing for all materials by establishing an office in the executive branch of the government.

Space Advisers Meet

STEEL sat in on the first meeting of the panel of scientific advisers to the House Science & Astronautics Committee. Among the subjects discussed was the need for the government and private industry to show more interest in fuel cell development (STEEL, Mar. 28, p. 51). The committee was told that small fuel cells for the home and office would tend to replace the need for central power stations in the next decade. The possibility of units for automobiles must not be overlooked either.

About $1.5 million is being spent yearly on research. Although the amount may be doubled in the next two years, the committee thinks that the development of fuel cell technology may lag. Private industry may tend to restrict the flow of information for proprietary reasons.

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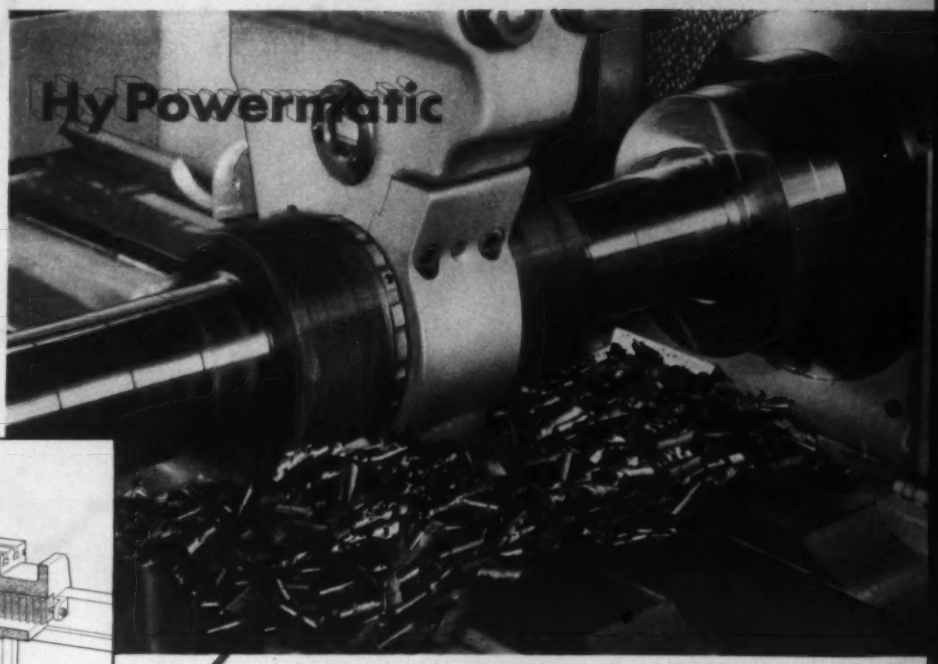

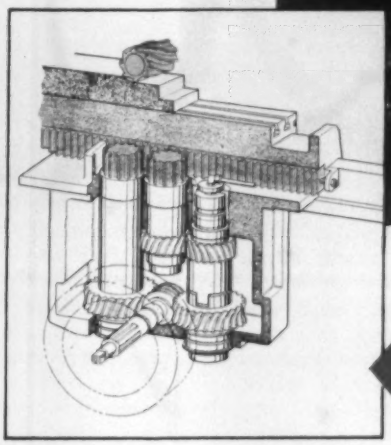

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Table feeds are infinitely variable up to 150" per minute and can be changed even during milling, by a simple twist of a dial. Hydramech Drive also incorporates Cincinnati's backlash eliminator, which permits both conventional and climb milling.

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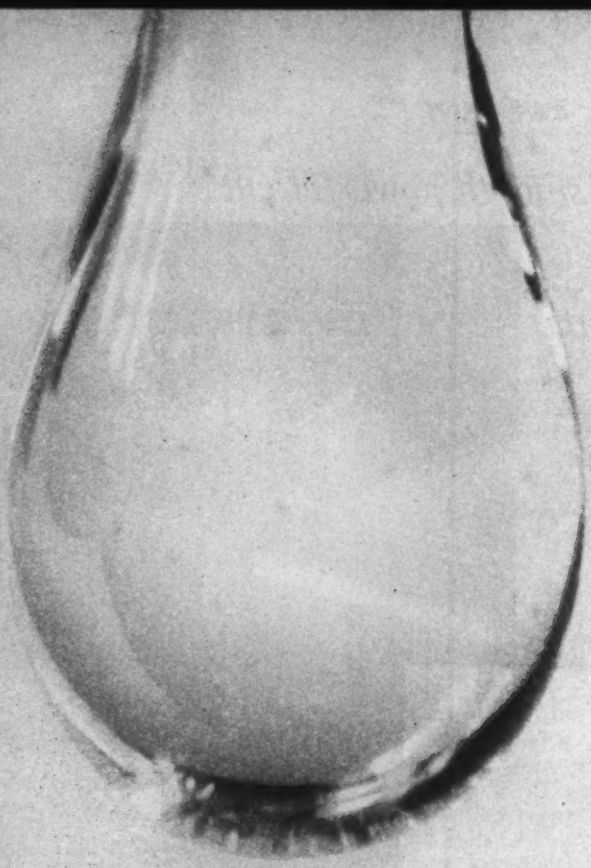
CINCINNATI
MILLING MACHINE DIVISION

water



comes in oceans, rivers, lakes, wells,
drops, buckets, pitchers and glasses.
it quenches thirsts, cooks food, puts
out fires, makes coffee and
brushes teeth. it spins mills,
runs electro-plants, cools motors
and power factories.
it spawns fish, sprinkles lawns,
floats boats, washes children
and grows flowers.

it sustains and nurtures.
it bends if you give it purpose.
it reshapes itself if you give it reason.
it is needed, wanted, feared,
praised and prayed for.

it is at the heart of all life.
it is in the arteries of all industry.
it is as close to us as skin
but as taken for granted as sky.

the end of water seems unbelievable.
if it is not on the horizon, it is just over it.
if it is not within sight,
it is just 'round the bend.
if it is not in the glass,
it is just in the spigot.

. . . this is the grand mirage . . .
the self-delusion that prevails
though the wells run low
and the streams go dry
and the water slips away.

we know water.
we know its ways.
we've learned its habits.
we've pulled it out of swamplands,
pushed it over mountains,
pumped it into deserts,
tunneled it through granite,
and rescued it from pollution.

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that is why,
for 130 years,
we've developed new uses for,
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diverted the courses of
and jealously stood guard over
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35th ANNUAL **FINANCIAL ANALYSIS** OF THE **STEEL INDUSTRY**

Supplement to **STEEL**

April 4, 1960

Steel's Finances Gained in '59

A YEAR of financial and operating paradoxes: That was 1959 for the U. S. steel industry.

Most of the industry was strikebound almost a third of a year (116 days), yet total sales and net income rose. But the industry was able to keep a smaller portion of the sales dollar than in 1958.

Steelmakers saw their working capital climb to a new high. Yet they found themselves poorer in current assets compared to current liabilities.

Steelworkers stayed away from the plants for over three months, yet both average employment and employment costs exceeded those of a year before when the mills operated 12 months. (Average employment rose from 706,120 to 709,439, and employment costs climbed from $4.7 billion to $5.0 billion.)

These paradoxes are the result of a record first half and a swift recovery from the strike in the last two months of the year. If steel consumers had not done such a thorough job of preparing for the third quarter emergency, 1959 would have been one of the saddest in history for steelmakers.

Now the industry is faced with another seemingly impossible situation: By the end of the current contract period, production costs will have risen by about $16 a ton (40 cents a ton for each penny an hour increase in labor costs). But last year, the industry made only $9.30 on each ton of ingots produced, and the trend has been downward for two years.

Generally, 1959 was somewhat better than 1958 for the 33 companies in STEEL's Financial Analysis. (These companies represent 93.72 per cent of the industry's capacity.) As might be expected, the firms which showed the best financial picture were those which were permitted to operate throughout the strike. Most of them were the smaller producers.

You have to go beyond the industry totals to get a clear picture of the trends. For instance, while 31 steelmakers had better net sales, seven saw net income decline. Sales of the 33 companies were up 13.04 per cent, but net income advanced only 5 per cent. And while net profit as a percentage of sales dropped for the total group, 23 (mostly the smaller ones) showed gains.

The slowdown in expansion of the industry is evident in several places. While total capitalization rose again to a new high, the increase—4 per cent—was considerably less than in most recent years. Also, long term debt gained less than usual. In 1958 the increase was 18.3 per cent. Last year it slipped to 7.5 per cent. In fact, 20 companies managed to reduce their debt. (Interest on long term debt climbed 18.2 per cent in 1959.) Provision for depreciation and depletion, continuing its downtrend, dropped 1.3 per cent. However, 19 companies, mostly the smaller ones, added to their depreciation reserves.

Federal taxes, as usual, followed the trend of net earnings. The government increased its take over 1958 by nearly 9 per cent. But the $785.2 million tax bill was well under the record bite of $1.05 billion in 1957. Nevertheless, the income tax take was almost as much as the $807.5 million the company was allowed to keep as net profit.

Stockholders fared pretty well in 1959. Only two firms failed to declare either a cash or stock dividend on common holdings. Sixteen increased their payout and only three cut it. All steelmakers made enough profit per share to cover their dividends. In 1958, five did not. Ownership continued to expand, with 3.5 per cent more persons holding common stock. The number of shares outstanding advanced by 10.78 per cent. The decrease in the number of holders of preferred stock was the smallest in several years.

• *An extra copy of this Financial Analysis is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

THIS SPECIAL REPORT is compiled from data supplied by 33 producers representing 93.72 per cent of the steelmaking capacity in the U. S.

Bold face type indicates totals (or averages) are not complete.

	Rated Ingot Capacity Net Tons		Ingot Production Net Tons		Steel Operating Rate, Per Cent		Net Income Per Ton Ingots Produced	
	1959	1958	1959	1958	1959	1958	1959	1958
United States Steel Corp.	41,916,000	40,212,000	24,445,353	23,818,889	58.32	59.23	$10.41	$12.66
Bethlehem Steel Corp.	23,000,000	23,000,000	14,257,356	13,393,034	61.99	58.23	8.22	10.28
Republic Steel Corp.	12,742,000	12,242,000	7,504,624	6,430,283	58.90	52.53	7.18	9.63
Jones & Laughlin Steel Corp.	8,000,000	7,500,000	4,896,000	4,947,000	61.20	65.96	6.02	4.69
National Steel Corp.	7,000,000	6,800,000	5,331,496	4,476,238	76.16	65.83	10.30	8.00
Youngstown Sheet & Tube Co.	6,750,000	6,500,000	4,100,717	3,659,482	60.75	56.30	7.55	5.88
Inland Steel Co.	6,500,000	5,800,000	4,227,317	4,714,904	65.04	81.29	11.44[12]	10.15
Armco Steel Corp.	6,400,000	6,394,200	5,128,907	4,506,127	80.14	70.47	15.03	12.76
Kaiser Steel Corp.	2,933,000	1,536,000	1,537,802	1,466,278	52.43	95.46	4.81‡	3.70[10]
Colorado Fuel & Iron Corp.	2,836,500	2,836,500	1,682,541	1,706,308	59.32	60.16	2.59	1.26
Wheeling Steel Corp.	2,400,000	2,400,000	1,397,002	1,580,214	58.21	65.84	5.03	5.63
McLouth Steel Corp.	2,040,000	1,574,000	1,215,693	1,396,103	59.59	88.70	8.27	7.16
Sharon Steel Corp.	1,861,000	1,989,000[23]	973,844	779,281	52.33	39.78[24]	2.20	0.29
Pittsburgh Steel Co.	1,560,000	1,416,000	935,411	955,593	59.96	67.49	1.06‡	0.91‡
Granite City Steel Co.	1,440,000	1,200,000	1,307,970	1,106,556	90.83	92.21	12.34	8.47
Crucible Steel Co. of America	1,431,180	1,424,530	886,726	710,823	61.96	49.90	6.89	6.01
Lukens Steel Co.	930,000	750,000	568,244	602,996	61.10	80.40	4.57[20]	6.94
Detroit Steel Corp.	900,000	1,500,000	824,757	447,613	91.64	29.84	14.48	2.58
Allegheny Ludlum Steel Corp.	864,200	864,200	460,785	418,254	53.32	48.40	24.50	13.97
Phoenix Steel Corp.[18]	846,760	846,760	556,031	226,110	65.67	26.70	[5]	[5]
Northwestern Steel & Wire Co.[7]	825,000	825,000	638,203	473,561	77.36	57.40	13.24	10.66
Alan Wood Steel Co.	800,000	800,000	740,254	505,341	92.53	63.17	6.56	4.17
Lone Star Steel Co.	800,000	800,000	751,477	384,475	93.93	48.06	18.86	2.77
Copperweld Steel Co.	660,000	660,000	[5]	[5]	[5]	[5]	[5]	[5]
Laclede Steel Co.	600,000	600,000	600,384	454,693	100.06	75.78	9.38	8.15
Keystone Steel & Wire Co.[19]	600,000	450,000	502,271	366,793	83.71	81.51	17.74	18.37
Universal-Cyclops Steel Corp.	577,410	577,410	552,897	376,719	95.75	65.24	16.39	9.09
Continental Steel Corp.	420,000	420,000	388,365	308,248	92.47	73.39	14.57	12.61
Atlantic Steel Co.	400,000	400,000	217,744	146,643	54.44	36.66	6.20	2.41
Carpenter Steel Co.	171,500	170,602	90,402	55,800	52.71	38.19[11]	50.83	13.79
Eastern Stainless Steel Corp.[16]	80,000	80,000	53,752	48,607	67.19	60.76	58.57	52.17
Vanadium-Alloys Steel Co[15]	47,600	42,000	14,465	9,736	30.39	23.18	141.73	122.82
Jessop Steel Co.	35,740	35,740	31,016	18,443	86.78	51.60	58.24	34.91
Totals (or averages)	138,367,890	132,645,942	86,819,806	80,491,145	62.75	60.68	$9.30	$9.56

	Number of Shares of Common Stock Outstanding		Common Stock Valuation		Preferred Stock Valuation	
	1959	1958	1959	1958	1959	1958
United States Steel Corp.	53,961,007	53,828,122	$899,350,117	$897,135,367	$360,281,100	$360,281,100
Bethlehem Steel Corp.	45,455,208	45,087,548	554,572,345	540,734,955	93,388,700	93,388,700
Republic Steel Corp.	15,693,074	15,635,759	157,035,361	156,462,211	None	None
Jones & Laughlin Steel Corp.	7,834,092	7,796,354	77,832,000	77,482,000	29,357,000	29,357,000
National Steel Corp.	7,538,643	7,466,281	75,386,430	74,662,810	None	None
Youngstown Sheet & Tube Co.	3,477,905	3,452,598	112,586,010	111,173,885	None	None
Inland Steel Co.	17,444,272	17,267,763[13]	117,170,361	109,945,512	None	None
Armco Steel Corp.	14,795,516	14,783,537	147,955,157	147,835,367	None	None
Kaiser Steel Corp.	3,279,123	3,264,462	3,279,123	3,264,462	56,531,575	57,089,625
Colorado Fuel & Iron Corp.	3,739,967	3,452,153	18,617,161	17,178,093	7,965,925	8,977,794
Wheeling Steel Corp.	2,095,528	1,936,677	20,955,280	19,366,770	34,297,500	34,758,000
McLouth Steel Corp.	1,722,877	1,489,130	4,307,192	3,722,825	11,543,800	25,745,150
Sharon Steel Corp.	1,104,649	1,102,501	11,106,880	11,085,400	None	None
Pittsburgh Steel Co.	1,586,595	1,585,890	15,865,950	15,858,900	24,194,300	24,194,300
Granite City Steel Co.	2,137,461	2,129,549	26,718,262	26,619,950	730,700	1,607,300
Crucible Steel Co. of America	3,865,631	3,793,586	48,320,388	47,419,825	9,988,500	None
Lukens Steel Co.	953,928	953,928	3,179,760	3,179,760	None	None
Detroit Steel Corp.	3,030,068	3,012,423	3,030,068	3,012,423	1,500,000	3,600,000
Allegheny Ludlum Steel Corp.	3,869,654	3,856,008	3,869,654	3,856,008	None	None
Phoenix Steel Corp.[18]	1,036,877	1,037,241	4,354,736	4,148,964	None	None
Northwestern Steel & Wire Co.[7]	2,502,113	2,502,113	12,510,565	12,510,565	None	None
Alan Wood Steel Co.	696,007	696,007	6,960,070	6,960,070	4,839,800	4,839,800
Lone Star Steel Co.	3,567,080	3,206,300	3,567,080	3,206,300	None	None
Copperweld Steel Co.	1,175,447	1,101,889	5,877,235	5,509,445	[14]	2,265,300
Laclede Steel Co.	206,250	206,250	4,125,000	4,125,000	None	None
Keystone Steel & Wire Co.[19]	1,875,000	1,875,000	2,604,167	2,604,167	None	None
Universal-Cyclops Steel Corp.	1,729,430	1,679,058	1,729,430	1,679,058	None	None
Continental Steel Corp.	516,401	516,401	7,229,614	7,229,614	None	None
Atlantic Steel Co.	396,500	396,500	2,000,000	2,000,000	700,000	700,000
Carpenter Steel Co.	918,910	898,355	4,594,550	4,491,775	None	None
Eastern Stainless Steel Corp.[16]	1,441,170	1,436,614	3,602,925	3,591,535	None	None
Vanadium-Alloys Steel Co.[15]	625,661	623,870	3,130,000	3,130,000	None	None
Jessop Steel Co.	646,280	599,508	646,280	599,508	None	None
Totals (or averages)	210,918,324	208,669,375	$2,364,069,151	$2,331,782,524	$635,318,900	$646,804,069

*Credit. ‡Debit. NA=Not Available.

[1] Excluding amount maturing in one year.

[2] After federal income taxes but before interest on long term debt.

[3] Based on average capitalization.

[4] Includes set-asides of $6,235,000 in 1959 and $10,565,000 in 1958 for future income taxes.

[5] Comparisons would be misleading because company's operations include fabricating division with no steel ingot capacity.

[6] Declared stock dividend of 5 per cent (51,807 shares).

FINANCIAL ANALYSIS

Net Income Per Ton Ingot Capacity 1959	1958	Capitalization Per Ton Ingot Capacity 1959	1958	Average Number Employed 1959	1958	Total Employment Costs 1959	1958	Long Term Debt[1] 1959	1958	19
$6.07	$7.50	$86.80	$89.56	200,329	223,490	$1,576,203,415	$1,488,523,225	$454,447,447	$487,565,195	$1,324,0
5.10	5.99	77.90	77.67	129,384	143,024	860,031,928	857,701,078	149,479,000	159,883,500	994,2
4.23	5.06	64.11	66.29	64,173	51,622	404,220,496	350,928,262	94,885,537	98,158,550	364,9
3.69	3.09	84.25	87.78	35,614	38,754	260,312,000	259,801,000	149,245,000	143,287,000	417,5
7.84	5.27	97.45	83.37	26,441	23,513	219,991,506	182,223,804	191,308,555	112,076,555	415,4
4.59	3.31	84.63	85.28	29,651	25,349	180,897,851	166,301,063	115,110,518	113,180,000	343,4
7.44[12]	8.25	104.26	104.28	30,680	28,211	179,201,667	186,057,673	215,427,700	171,410,000	345,1
12.04	8.99	132.04	116.43	40,307	37,192	295,099,267	270,481,289	174,599,000	107,056,000	322,3
2.52‡	3.53[10]	131.07	265.61	11,602	9,972	71,515,000	69,116,000	232,577,116	243,933,293	92,0
1.54	0.76	80.14	69.00	20,053	19,001	121,043,096	125,498,290	78,318,700	49,708,000	122,4
2.93	3.71	99.40	98.93	12,246	11,320	88,105,032	92,520,540	31,118,600	39,032,800	152,1
4.93	6.35	78.42	103.28	4,207	3,846	27,107,225	26,972,932	67,420,000	75,546,000	76,4
1.15	0.11	48.79	45.38	7,245	6,362	41,042,503	37,859,332	10,400,000	11,800,000	69,2
0.64‡	0.61‡	74.57	84.76	9,371	8,259	62,302,075	62,895,149	29,603,370	31,000,000	46,6
11.21	7.81	93.27	103.23	5,139	4,912	40,087,176	33,639,735	36,758,581	37,291,000	70,4
4.27	3.00	107.31	99.78	14,774	12,390	93,755,000	82,994,000	20,589,000	23,472,000	74,4
2.79[20]	5.58	78.53	85.04	5,156	4,947	32,805,143	36,160,875	26,517,095	20,500,000	43,3
13.27	0.77	95.89	54.48	3,924	3,113	31,095,220	21,875,507	20,000,000	22,000,000	61,1
13.06	6.76	177.29	163.61	13,700	11,400	90,187,059	83,259,851	44,036,600	36,124,200	105,4
[5]	[5]	[5]	[5]	2,951	2,496	19,666,251	12,515,892	8,324,260	9,527,141	20,2
10.24	6.12	53.52	47.52	2,790	2,399	22,322,997	17,910,451	6,000,000	7,245,561	25,4
6.07	2.64	46.66	47.78	3,824	3,362	28,920,226	22,737,042	None	4,537,052	25,3
17.72	1.33	127.11	124.87	4,536	4,026	32,712,851	23,333,425	37,000,000	50,176,099	61,1
[5]	[5]	[5]	[5]	5,515	4,811	46,540,256	34,326,712	18,630,168	11,525,485	41,1
9.39	6.17	59.87	53.56	4,077	3,433	29,739,993	22,845,887	3,600,000	3,800,000	28,1
14.85	14.97	77.43	91.77	3,128	2,603	25,790,310	19,909,097	None	None	43,1
15.69	5.93	139.18	107.45	5,675	4,763	42,281,461	32,200,262	22,500,000	11,555,707	56,1
13.47	9.26	73.10	65.64	2,612	2,490	17,194,601	14,811,206	1,600,000	1,800,000	21,1
3.37	0.88	45.02	44.11	1,553	1,538	10,040,345	8,174,086	4,050,000	4,750,000	11,1
26.79	5.27[11]	286.89	267.00	4,155	3,388	28,188,029	20,884,109	6,000,000	6,000,000	38,1
39.35	31.70	378.43	353.64	1,595	1,389	12,353,632	9,738,120	5,117,700	5,123,600	21,1
43.07	28.47	467.47	504.77	1,734	1,555	9,239,014	7,356,745	2,434,000	2,500,000	16,1
50.55	18.02	429.02	339.46	1,298	1,190	11,162,167	7,504,520	2,460,300	1,332,800	12,1
$5.84	$5.80	$87.64	$87.82	709,439	706,120	$5,011,154,792	$4,689,057,159	$2,259,558,247	$2,102,897,538	$6,866,1

Book Value Per Share of Common Stock 1959	1958	Number of Common Stockholders 1959	1958	Number of Preferred Stockholders 1959	1958	Preferred Dividend Requirements 1959	1958	Net Earnings Per Common Share 1959	1958	Dividends Per Share on Preferred 1959	195
$52.32	$51.16	268,247	263,311	61,928	62,957	$25,219,677	$25,219,677	$4.25	$5.13	$7.00	$7.0
34.08	34.01	186,581	171,010	18,290	18,674	6,537,209	6,537,209	2.44	2.91	7.00	7.0
46.01	45.62	89,644	91,969	None	None	None	None	3.43	3.96	None	Non
63.23	62.30	51,638	52,066	5,870	5,873	1,468,000	1,468,000	3.58	2.79	5.00	5.0
65.11	60.92	NA	NA	None	None	None	None	7.28	4.80	None	Non
131.16	127.77	17,593	17,365	None	None	None	None	8.90	6.23	None	Non
26.50	25.10[13]	32,900	26,400	None	None	None	None	2.77[12]	2.77[13]	None	Non
45.32	43.12	70,920	72,305	None	None	None	None	5.21	3.89	None	Non
29.07	32.76	7,880	7,370	12,084	12,491	3,300,113	2,941,900	3.26‡	0.76[10]	1.97[8]	1.7
37.71	39.70	26,793	23,894	1,850	1,896	463,661	525,650	1.04	0.47	5.25[8]	5.2
82.63	84.50	12,789	12,536	4,848	4,848	1,714,875	1,737,900	2.54	3.70	5.00	5.0
47.03	41.15	6,481	4,807	2	1,174	899,362	1,590,197	5.32	5.65	2.625	7.6
72.79	71.17	8,271	9,237	None	None	None	None	1.94	0.20	None	Non
39.41	40.88	5,833	5,635	2,927	2,902	1,308,148	1,308,148	1.45‡	1.37‡	10.50[8]	10.5
45.30	39.90	10,736	11,272	1	1	52,242	93,331	7.53	4.36	5.50	5.5
31.82	31.28	15,231	14,168	3,368	None	293,851	None	1.50	1.13	2.94	Non
48.76	45.37	3,209	3,300	None	None	None	None	2.72[20]	4.38	None	Non
21.39	18.63	8,545	7,410	1	2	135,880	230,250	3.90	0.31	6.00	6.0
28.21	27.30	18,944	19,678	None	None	None	None	2.92	1.52	None	Non
23.73	21.83	11,788	14,649	None	None	None	None	2.03	1.90‡	None	Non
15.25	12.77	2,399	1,321	None	None	None	None	3.38	2.02	None	Non
46.68	41.45	1,932	1,692	597	581	241,990	241,990	6.63	2.68	5.00	5.0
18.13	15.51	15,239	15,034	None	None	None	None	3.97	0.33	None	Non
40.58	38.37	8,451	7,888	[14]	722	91,005	138,356	5.00	1.76	5.56[8]	5.5
156.70	137.40	1,728	1,691	None	None	None	None	27.31	17.96	None	Non
24.78	22.02	4,480	4,425	None	None	None	None	4.75	3.59	None	Non
33.46	30.07	3,512	2,651	None	None	None	None	5.24	2.04	None	Non
56.36	49.90	3,408	3,123	None	None	None	None	10.95	7.53	None	Non
33.44	30.75	2,090	2,313	259	264	45,997	45,997	3.29	0.77	7.00	7.0
47.01	44.03	6,461	6,349	None	None	None	None	5.00	0.86	None	Non
17.46	16.13	5,318	3,793	None	None	None	None	2.18	1.77	None	Non
31.67	29.97	3,140	2,712	None	None	None	None	3.28	1.92	None	Non
19.92	18.01	4,625	4,490	None	None	None	None	2.80	1.07	None	Non
....	....	916,806	885,864	112,025	112,385	$42,242,010	$42,078,605	$3.63	$3.49	....	....

[1] Fiscal year ended July 31.
[8] Includes two classes of preferred stock.
[9] For 1959, credit of $180,000 received from other members of tax return group and set-aside of $250,000 for future income taxes. For 1958, includes set-aside of $1,125,000 for future income taxes.
[10] Reflects $1,825,000 special credit relating to prior years.
[11] Based on capacity of 146,102 net tons.
[12] Reflects special credit of $3,288,870.
[13] Adjusted for 3-for-1 stock split in April, 1959.
[14] Preferred stock redeemed Dec. 14, 1959.

OF THE STEEL INDUSTRY FO

Surplus 1959	Surplus 1958	Total Capitalization 1959	Total Capitalization 1958	Provision for Depreciation, Depletion 1959	Provision for Depreciation, Depletion 1958	Total Income—Per Cent of Capitalization[2] 1959	Total Income—Per Cent of Capitalization[2] 1958	Interest on Long Term Deb 1959	Interest on Long Term Deb
24,096,165	$1,856,569,230	$3,638,174,829	$3,601,550,892	$189,854,452	$204,899,055	7.48	8.69	$17,647,717	$11
94,353,908	992,497,965	1,791,793,953	1,786,505,120	97,541,623	108,655,366	6.77	8.07	4,156,373	6
64,964,658	556,853,360	816,885,556	811,474,121	34,666,022	33,074,198	7.07	7.95	3,849,910	2
17,532,000	408,254,000	673,966,000	658,380,000	48,005,000	48,038,000	5.19	4.24	5,527,000	4
15,487,144	380,149,921	682,182,129	566,889,286	36,487,856	39,350,724	8.96	7.01	6,255,025	3
43,576,513	329,976,887	571,273,041	554,330,772	25,505,695	29,662,816	6.25[3]	4.63[3]	4,215,663	3
45,100,106	323,445,618	677,698,167	604,801,130	35,208,330	29,752,455	8.33[12]	8.93	8,097,677	6
22,533,000	489,580,922	845,087,157	744,472,289	36,937,862	34,456,960	9.82	8.23	5,896,451	3
92,050,613	103,682,885	384,438,427	407,970,265	28,795,515	17,825,807	1.21	4.29[10]	12,064,224	12
22,420,901	119,864,788	227,322,687	195,728,675	12,723,538	13,176,766	3.59	2.64	3,786,858	3
52,196,561	144,283,105	238,567,941	237,440,675	14,674,809	14,697,131	3 48	4.31	1,262,665	1
76,712,915	57,550,505	159,983,907	162,564,480	14,105,539	13,588,974	7.57	7.40	4,280,293	4
69,296,208[25]	67,379,042[25]	90,803,088	90,264,442	3,791,389	3,678,381	2.87	0.85	462,341	
46,667,499	48,966,001	116,331,119	120,019,201	8,074,608	7,705,900	0.49	0.62	1,567,030	1
70,104,056	58,352,822	134,311,599	123,871,072	6,556,861	4,953,639	13.27	9.07	1,687,017	1
74,687,579	71,243,354	153,585,467	142,135,179	9,222,824	9,248,738	4.52	3.67	842,695	
43,331,902	40,096,987	73,028,757	63,776,747	3,377,804	2,114,126	4.77[20]	6.56	883,680	
61,774,546	53,110,795	86,304,614	81,723,218	4,463,202	4,726,999	15.24	2.98	1,209,526	1
05,303,887	101,412,362	153,210,141	141,392,570	8,551,837	9,628,709	8.38	5.15	1,542,925	1
20,250,714	18,491,995	32,929,710	32,168,100	1,684,545	2,208,478	8.18	4.07‡	583,251	
25,647,435	19,449,016	44,158,000	39,205,142	2,321,004	2,241,295	19.89	13.96	332,150	
25,529,855	21,890,370	37,329,725	38,227,292	4,497,535	3,822,587	13 65	6.30	239,592	
61,116,971	46,517,315	101,684,051	99,899,714	4,959,423	4,693,713	16.39	3.80	2,493,279	2
41,819,960	36,765,495	66,327,363	56,065,725	3,032,350	2,934,751	9.84	4.74	555,138	
28,195,405	24,212,753	35,920,405	32,137,753	1,467,012	1,497,801	16.19	12.10	181,146	
43,851,738	38,690,355	46,455,905	41,294,522	1,654,005	1,170,204	19.18	16.31	None	
56,136,945	48,805,318	80,366,375	62,040,083	4,529,258	3,866,948	11.67	5.94	690,020	
21,873,686	18,540,438	30,703,300	27,570,052	1,388,381	1,353,381	18.66	14.39	73,250	
11,257,828	10,192,199	18,007,828	17,642,199	739,108	658,207	9.09	4.11	288,228	
38,606,752	35,058,814	49,201,302	45,550,589	2,768,431	2,818,425	9.89	2.11	270,000	
21,554,168	19,575,861	30,274,793	28,290,996	1,186,860	1,108,967	11.55	9.80	348,258	
16,687,543	15,570,248	22,251,543	21,200,248	552,987	368,462	9.75	5.65	118,750	
12,226,770	10,199,871	15,333,350	12,132,179	323,178	275,942	12.68	6.24	137,959	
366,945,931	$6,567,230,597	$12,125,892,229	$11,648,714,728	$649,648,843	$658,253,905	9.45	6.26	$91,546,091	$77,4

Per ferred 1958	Dividends Per Share on Common 1959	Dividends Per Share on Common 1958	Federal Income Taxes 1959	Federal Income Taxes 1958	Total Assets 1959	Total Assets 1958	Current Assets 1959	Current Assets 1958
$7.00	$3.00	$3.00	$233,000,000	$285,000,000	$4,559,137,420	$4,436,836,950	$1,423,773,079	$1,423,121,359
7.00	2.40	2.40	123,000,000	131,000,000	2,269,382,851	2,195,045,817	1,118,322,076	1,032,662,441
None	3.00	3.00	52,800,000	60,500,000	1,014,870,722	962,981,434	400,351,602	367,820,469
5.00	2.50	2.50	27,594,000	18,090,000	1,315,504,000	1,263,397,000	277,078,000	261,491,000
None	3.00	3.00	58,250,000	35,000,000	842,803,631	687,068,257	366,993,919	222,415,590
None	5.00	5.00	30,600,000[4]	20,170,000[4]	715,864,170	660,160,264	315,774,294	310,822,853
None	1 53⅓	1.50[13]	39,150,000	42,440,000	778,266,624	686,200,216	248,948,201	219,689,478
None	3.00	3.00	75,862,114	55,860,180	1,021,681,077	896,936,406	533,951,597	467,881,403
1.73[8]	0.40	0.40	70,000[9]	2,175,000[9]	475,093,151	481,950,038	91,170,433	89,865,678
5.25[8]	28	28	3,723,600[29]	2,468,500[29]	293,250,052	267,911,968	128,519,849	113,874,713
5.00	2.50	2.00	4,209,000	6,954,000	278,087,118	280,103,787	115,797,888	117,754,498
7.625[8]	None	None	5,600,000	2,430,000	200,992,828	194,021,878	82,314,110	75,381,741
None	1.00	0.80	1,787,000	190,000*	109,029,688	105,265,204	57,028,842	52,301,057
10.50[8]	None	None	394,000[26]	726,000[26]	157,162,377	161,047,966	55,722,681	57,460,719
5.50	2.10	1.60	17,230,000[17]	10,127,000[17]	185,936,963	166,611,894	67,691,679	54,092,353
None	0.80	0.50	4,900,000	2,315,000	187,561,610	170,619,863	93,209,121	85,761,976
None	1.00	2.00	2,520,000	4,255,000	85,504,610	78,678,654	33,097,256	30,861,537
6.00	1.12½	0.50	11,910,000	1,250,000	114,804,107	108,346,407	44,342,358	35,555,402
None	2.00	2.00	11,960,000	6,174,000	190,234,819	166,887,541	112,128,759	86,241,099
None	6	None	2,475,000	2,185,396*	51,137,159	46,002,365	29,810,264	23,251,195
None	0.90	0.50	9,200,000	5,840,000	53,521,422	55,939,181	18,932,417	20,868,384
5.00	1.40	0.70	4,118,000	997,000	50,908,919	53,087,991	17,868,095	19,385,835
None	21	21	14,598,000[22]	600,000[22]	148,831,428	135,228,362	66,522,889	49,031,801
5.50[8]	2.00	1.00	6,336,000	2,175,000	80,427,491	74,161,919	43,764,618	39,171,825
None	8.00	8.00	6,400,000	4,075,000	44,105,881	38,879,951	24,818,458	22,953,412
None	2.00	2.00	9,256,741	6,992,003	64,232,276	56,881,737	21,286,843	18,462,596
None	0.97	0.75	9,145,000	3,320,000	100,570,316	73,110,896	53,562,141	32,608,693
None	4.50	3.50	6,275,000	4,400,000	36,498,662	32,738,185	20,799,922	17,501,948
7.00	0.60	None	1,635,000	241,000	22,613,698	21,078,228	9,675,185	7,557,994
None	2.00	3.00	4,283,000[27]	3,365,000	60,579,776	53,145,092	29,988,151	23,197,147
None	0.86	0.75	3,415,000	2,720,000	37,808,329	35,877,776	27,260,451	25,315,257
None	1.60	2.60	2,026,000	1,199,000	26,535,641	23,516,895	14,912,909	12,663,446
None	30	30	2,252,000	816,000	21,332,323	14,320,066	13,043,046	8,563,000
....	....	....	$785,186,455	$721,299,287	$15,594,271,139	$14,684,040,188	$5,958,461,133	$5,425,587,899

[18] Fiscal year ended June 30.
[16] Data for 1958 adjusted to reflect 2-for-1 stock split Apr. 15. 1959.
[17] After adjustment for previous and future years.
[18] Formerly Barium Steel Corp.
[19] Company operates on fiscal year ending June 30. Data adjusted to calendar year.
[20] Income does not include special credit of $1,590,347 for adjustments for prior years.
[21] Stock dividend of 10 per cent.
[22] Includes set-asides for future income taxes.

R 1959

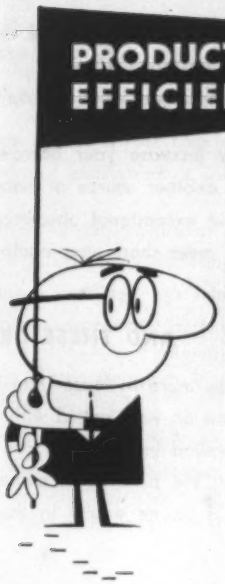
Compiled by **STEEL**

April 4, 1960

Debt 1958	Net Sales 1959	Net Sales 1958	Net Profit—Per Cent of Net Sales 1959	Net Profit—Per Cent of Net Sales 1958	Net Income 1959	Net Income 1958	
$11,471,668	$3,643,040,035	$3,472,177,091	6.99	8.68	$254,563,401	$301,558,231	United States Steel Corp.
6,340,001	2,079,082,467	2,024,282,732	5.64	6.80	117,235,859	137,741,946	Bethlehem Steel Corp.
2,619,822	1,076,832,407	910,382,817	5.00	6.80	53,890,116	61,921,680	Republic Steel Corp.
4,729,000	765,672,000	654,060,000	3.85	3.55	29,485,000	23,198,000	Jones & Laughlin Steel Corp.
3,932,260	736,978,650	539,957,294	7.45	6.64	54,897,360	35,827,414	National Steel Corp.
3,680,668	617,889,289	506,959,574	5.01	4.24	30,956,040	21,501,320	Youngstown Sheet & Tube Co.
6,148,542	713,215,002	661,253,596	6.78[12]	7.24	48,354,030[12]	47,869,042	Inland Steel Co.
3,749,417	1,022,428,742	867,390,909	7.54	6.63	77,064,249	57,512,151	Armco Steel Corp.
12,084,804	202,126,940	181,385,288	3.66‡	2.99[10]	7,401,076‡	5,422,271[10]	Kaiser Steel Corp.
3,011,602	280,288,103	276,163,902	1.56	0.78	4,364,554	2,147,223	Colorado Fuel & Iron Corp.
1,332,882	211,633,718	221,009,355	3.32	4.03	7,033,050	8,899,267	Wheeling Steel Corp.
4,248,641	177,446,839	171,590,704	5.67	5.83	10,058,232	9,998,374	McLouth Steel Corp.
546,399	119,760,979	99,970,977	1.79	0.23	2,145,593	224,942	Sharon Steel Corp.
1,613,198	150,647,405	134,475,314	0.66‡	0 64‡	994,310‡	865,593‡	Pittsburgh Steel Co.
1,864,754	164,371,219	125,272,603	9.82	7.48	16,142,341	9,373,580	Granite City Steel Co.
934,742	219,229,082	186,363,233	2.79	2.29	6,106,443	4,274,793	Crucible Steel Co. of America
None	83,178,393	99,256,110	3.12[20]	4.21	2,598,496[20]	4,181,986	Lukens Steel Co.
1,283,893	117,047,867	61,781,666	10.20	1.87	11,939,492	1,153,692	Detroit Steel Corp.
1,438,827	232,559,479	202,572,808	4.85	2.89	11,290,664	5,844,803	Allegheny Ludlum Steel Corp.
655,941	60,615,789	27,614,634	3.48	7.12‡	2,108,754	1,966,545‡	Phoenix Steel Corp.[18]
423,211	83,781,108	60,468,595	10.09	8.35	8,450,321	5,049,890	Northwestern Steel & Wire Co.[7]
297,494	81,074,208	54,163,265	5.99	3.89	4,855,885	2,109,203	Alan Wood Steel Co.
2,729,782	112,944,477	45,804,182	12.55	2.32	14,175,678	1,064,697	Lone Star Steel Co.
577,117	138,364,827	93,526,153	4.32	2.23	5,972,457	2,081,114	Copperweld Steel Co.
185,000	87,671,707	63,159,247	6.42	5.86	5,632,652	3,704,251	Laclede Steel Co.
None	82,838,545	61,198,258	10 76	11.01	8,911,383	6,736,519	Keystone Steel & Wire Co.[19]
563,898	127,694,091	84,226,986	7.10	4.07	9,061,057	3,425,434	Universal-Cyclops Steel Corp.
80,750	57,083,825	46,798,182	9.91	8.31	5,657,052	3,887,634	Continental Steel Corp.
372,410	29,433,860	22,083,434	4.58	1.60	1,349,526	353,235	Atlantic Steel Co.
192,000	69,056,163	49,880,625	6.65	1.54	4,594,850[27]	769,723	Carpenter Steel Co.
236,525	67,221,402	49,520,681	4.68	5.12	3,148,131	2,535,776	Eastern Stainless Steel Corp.[16]
1,320	27,076,982	19,764,547	7.57	6.05	2,050,100	1,195,742	Vanadium-Alloys Steel Co.[15]
113,072	30,769,050	17,463,613	5.87	3.69	1,806,510	643,910	Jessop Steel Co.
77,459,640	$13,669,054,660	$12,091,978,375	5.91	6.36	$807,583,890	$769,375,705	Totals (or averages)

Current Liabilities 1959	Current Liabilities 1958	Ratio of Current Assets to Current Liabilities 1959	Ratio of Current Assets to Current Liabilities 1958	Working Capital 1959	Working Capital 1958	
$808,234,693	$726,824,930	1.76—1	1.96—1	$615,538,386	$696,296,429	United States Steel Corp.
393,188,898	332,340,697	2.84—1	3.11—1	725,133,178	700,321,744	Bethlehem Steel Corp.
165,177,317	121,924,676	2.42—1	3.02—1	235,174,285	245,895,793	Republic Steel Corp.
109,767,000	108,371,000	2.52—1	2.41—1	167,311,000	153,120,000	Jones & Laughlin Steel Corp.
125,396,314	85,128,049	2.93—1	2.61—1	241,597,605	137,287,541	National Steel Corp.
114,891,129	82,364,492	2.75—1	3.77—1	200,883,165	228,458,361	Youngstown Sheet & Tube Co.
91,760,406	73,755,991	2.71—1	2.98—1	157,187,795	145,933,487	Inland Steel Co.
146,616,799	126,909,538	3.64—1	3.69—1	387,334,798	340,971,865	Armco Steel Corp.
68,304,724	51,879,773	1.33—1	1.73—1	22,865,709	37,985,905	Kaiser Steel Corp.
39,020,633	44,833,237	3.29—1	2.54—1	89,499,216	69,041,476	Colorado Fuel & Iron Corp.
29,742,865	31,864,342	3.89—1	3.70—1	86,055,023	85,890,156	Wheeling Steel Corp.
41,008,921	31,457,398	2.01—1	2.40—1	41,305,189	43,924,343	McLouth Steel Corp.
18,226,600	15,000,762	3.13—1	3.49—1	38,802,242	37,300,295	Sharon Steel Corp.
27,367,258	26,591,765	2.04—1	2.16—1	28,355,423	30,868,954	Pittsburgh Steel Co.
30,640,556	20,643,760	2.21—1	2.62—1	37,051,123	33,448,593	Granite City Steel Co.
31,605,081	25,308,824	2.95—1	3.39—1	61,604,040	60,453,152	Crucible Steel Co. of America
8,487,853	11,357,868	3.90—1	2.72—1	24,609,403	19,503,669	Lukens Steel Co.
9,677,493	8,153,189	4.58—1	4.36—1	34,664,865	27,402,213	Detroit Steel Corp.
34,429,862	23,534,674	3.26—1	3.66—1	77,698,897	62,706,425	Allegheny Ludlum Steel Corp.
8,522,868	4,714,343	3.50—1	4.93—1	21,287,396	18,536,852	Phoenix Steel Corp.[18]
3,360,422	10,533,363	5.63—1	1.98—1	15,571,995	10,335,021	Northwestern Steel & Wire Co.[7]
10,863,889	12,303,063	1.64—1	1.58—1	7,004,206	7,082,772	Alan Wood Steel Co.
19,966,962	9,773,378	3.33—1	5.02—1	46,555,927	39,258,423	Lone Star Steel Co.
13,515,363	17,527,438	3.24—1	2.23—1	30,249,255	21,644,387	Copperweld Steel Co.
7,610,476	6,277,198	3.26—1	3.66—1	17,207,982	16,676,214	Laclede Steel Co.
17,776,372	15,587,215	1.20—1	1.18—1	3,510,471	2,875,381	Keystone Steel & Wire Co.[19]
20,203,941	11,070,813	2.65—1	2.95—1	33,358,200	21,537,880	Universal-Cyclops Steel Corp.
4,226,986	3,862,975	4.92—1	4.53—1	16,572,936	13,638,973	Continental Steel Corp.
3,700,556	2,822,585	2.61—1	2.68—1	5,974,629	4,735,409	Atlantic Steel Co.
11,128,030	7,346,325	2.69—1	3.16—1	18,860,121	15,850,822	Carpenter Steel Co.
7,533,536	7,586,780	3.62—1	3.34—1	19,726,915	17,728,477	Eastern Stainless Steel Corp.[16]
4,284,098	2,316,647	3.48—1	5.47—1	10,628,811	10,346,799	Vanadium-Alloys Steel Co.[15]
5,948,028	2,187,887	2.19—1	3.91—1	7,095,018	6,375,113	Jessop Steel Co.
$2,432,185,929	$2,062,154,975	2.45—1	2.63—1	$3,526,275,204	$3,363,432,924	Totals (or averages)

[12] Includes 91,000 tons added May 1, 1958.
[14] Based on average annual capacity.
[15] Includes deferred income tax payments of $1,165,000 in 1959 and $700,000 in 1958.
[20] Net credit after refunds and adjustments.
[27] Including effect of a $320,000 tax saving from the carry-forward of a portion of the subsidiary's net operating losses from prior years.
[28] Stock dividends of 8 per cent in 1959 and 2 per cent in 1958.
[29] Includes $887,500 credit in 1959 and $170,300 set-aside in 1958 for future income taxes.
[30] Stock dividends of 6 per cent in 1959 and 5 per cent in 1958.



Four Ways to Get It

When Capital Is Limited . . .

- **Leasing**
- **Rebuilding**
- **Buying Used Equipment**
- **Contracting Out**

YOU WANT A NEW CAR—the old one is getting expensive to operate. But you can't afford a new one. That doesn't mean you must be content to drive the old hack as is. You can rent a new car, have your old one overhauled, or buy a good used car (or take a bus).

Use the same approach in obtaining equipment to trim costs in your plant. Besides buying new equipment, there are these ways to achieve production efficiency:

Lease.
Rebuild.
Buy used equipment.
(Or subcontract the work.)

One of your most important jobs is originating, evaluating, and selling ideas for production efficiency. The more effectively you do that, the greater will be metalworking's chances of regaining a competitive position in world markets. You can increase your effectiveness (and thus your value to your company) by gaining a working knowledge of the ways to finance production efficiency proposals. In the Mar. 21 issue, STEEL told how to find the money for new equipment purchases. Consider four alternatives:

Leasing

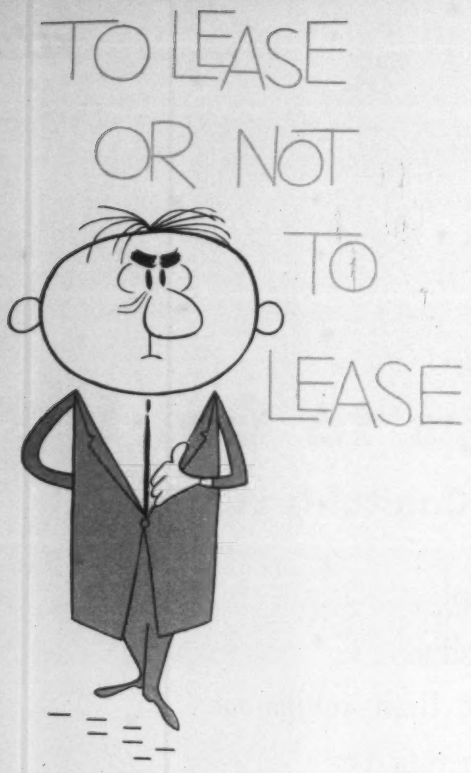
It's almost always cheaper to buy than to lease. But there may be other circumstances—like tax timing advantages—that will make leasing your best bet. Let's check the pros and cons of leasing to see where this method of financing can help you . . .

• **Working Capital**—Suppose you want to buy a $20,000 machine tool. You have the cash. But you also need to step up your research and marketing activities. If you find that the money would earn a greater return when invested in research or marketing than in equipment, you might do that—and lease the equipment. You can "have your cake and eat it too." Likewise in the case of a sale and leaseback. Here you have all the equipment you need, but you require more working capital. One solution is to sell the equipment to a lease financing firm, then rent it back. Result: You have both the working capital and the machinery.

But first consider this: You might be able to borrow the needed funds cheaper than you can lease the equipment.

• **Credit Saving** — Leasing proponents argue: "Why not lease your equipment and save your bank credit for other purposes?" In some cases, that's a sound procedure. But remember that leasing creates a cash obligation too—and thus can limit your borrowing ability. In fact, some banks convert lease obligations to debt obligations before considering a loan request. Many insurance companies consider leasing the same way as long term, secured, debt.

• **Tax Advantages** — Leasing does not save taxes—it postpones them, points out Robert Sheridan, president, Nationwide Leasing Co., Chicago. Since leasing charges are tax



Before You Decide to Lease . . .

CHECK THESE ADVANTAGES

1. You can use working capital elsewhere.
2. You may postpone taxes.
3. You can increase working capital through sale and lease-back.
4. You may increase your borrowing power.
5. You get another source of financing.
6. You avoid exceptional obsolescence—for a fee.
7. You can meet short term equipment needs.

AND THESE DRAWBACKS

1. You'll pay more to lease than buy.
2. You're put on your guard with the Internal Revenue Service.
3. You're limited in what you can do with the equipment.
4. You lose "the prestige of ownership."
5. You build up no equity in the equipment.

deductible as expenses, they can reduce taxable income during the years in which the equipment is most productive, he points out. Take the case of equipment that tends to become obsolete much faster than government depreciation tables permit it to be written off. Example: A machine that should be replaced in seven years, but must be depreciated over 15 years. By leasing that equipment for seven years, the company can deduct its full cost during that period, Mr. Sheridan notes.

• **Hedge Against Inflation**—Some leasing proponents say it permits you to hedge against inflation since you always pay for equipment in current dollars. You can probably discount that theory since you repay a loan in current dollars too. (And you may not pay off as much of the loan in the early years as you do when you lease.) If you're comparing leasing with full cash payment at time of purchase, remember that leasing is considerably more expensive—you pay the lessor to assume the risk of inflation.

• **Credit** — Leasing lets you get equipment when you can't get credit, say some proponents. "That's seldom true," points out R. L. Boothman, president, Manufacturers Leasing Corp., Pittsburgh. "Since there is no 'down payment' and resale values fall sharply, it behooves the investor to look most carefully to the credit of the lessee," he says. So leasing is of no value to the shaky operator—it's a source of credit for the soundly managed firm. It may make financing available to a small firm that can't otherwise get long term credit.

• **Short Term Contracts**—Suppose your company wins a three year contract. You know you could boost profit on the job if you had more efficient equipment. But top management doesn't want to buy it because it will probably have to stand idle when the contract runs out. By leasing it, you can get the cost savings and you're not stuck with a used machine at the end of the period. Of course, payments are high on short term leases (see table, Page 103).

• **Guard Against Obsolescence** — Under leasing, you pay someone else to assume the risk of obsolescence. And you have the protection of charging off the cost of equipment faster for tax purposes.

• **Single Source** — Some third party lessors (but few equipment builders) will lease any type of equipment. Nationwide, for example, has leased items ranging from sound systems to a refrigerated fishing scow.

• **Flexibility** — Leasing makes it easier to enter or withdraw from an industry or product line. Some firms have leased equipment to make products they figured would have market value for a limited time. In cases like that, you might compare leasing with subcontracting.

Mr. Sheridan points out that leasing is a good way to acquire equipment for pilot plants and experimental projects.

Some proponents say leasing offers flexibility in disposition of equipment. But if the machine is completely amortized during the basic lease period, leasing gives you the questionable benefit of abandoning a machine you have already paid for. If it is not completely amortized, you achieve some flexibility—at a cost.

Leasing can be less flexible

If You Do Decide to Lease . . .

WATCH OUT FOR THESE PROVISIONS

The rental charge isn't the only factor in determining the cost of leasing under any plan. Other points to check include:

1. Which pattern of payments best suits your cash needs?
2. Will you have to pay extra if equipment is used on more than one shift?
3. Are freight and installation charges additional?
4. Is an advance payment or security deposit required?
5. Is any service or maintenance provided? (It seldom is.)
6. Do you get new equipment warranties and guarantees? (You should.)
7. Is there a form of purchase option that may cause you trouble with the Internal Revenue Service?
8. Are there restrictions on what you make with the equipment?
9. Are you required to buy the lessor's accessories to be used with the machine?
10. Do you pay all insurance and local taxes? (That's normal.)

Compare Costs of Various Plans

Annual Payments as Percentage of Purchase Price for Selected Plans

Year	Plan A	Plan B	Plan C	Plan D	Plan E
1st . . .	35%*	36%	25.0%	39.0%	28%
2nd . .	25	36*	24.5	43.0	18
3rd . .	15	18	24.5	30.9	18
4th . . .	10	6	24.5	13.4	18
5th . . .	10	6	24.5*	5.6*	18
6th . .	10	6	8.2	5.0	18
7th . . .	10	6	8.2	3.6	6
8th . . .	10	6	8.2	2.4	6
9th . . .	10	6	8.2	2.1	6
10th . .	10	6	8.2	1.0	6*
Totals†	145%	132%	164%	146%	142%

*Contract can be terminated at the end of this or any subsequent year. †A higher total cost doesn't necessarily mean the plan is more expensive; examine the amount paid in early years.

than ownership. Suppose you want to get rid of a machine during the basic lease period. You'll probably be forced to continue paying for an asset you no longer need. If you owned it, you could sell it.

• **Pay as You Go**—Leasing permits piecemeal financing of capital additions. In cases where long term debt financing must be arranged on a larger scale than the value of the needed equipment, leasing permits you to adjust financing to each machine as it is acquired.

• **Rent Now, Buy Later**—This promotion point has nearly disappeared since the Internal Revenue Service has done some cracking down. "Purchase options are to be avoided," declares J. M. Randolph, assistant secretary, Textron Inc., Providence, R. I. Internal Revenue may look upon them as conditional sales and you'll lose leasing's tax timing benefits. Also beware of the lease wherein you pay the entire cost of a long term asset in the first few years of its use, advises Mr. Boothman. Internal Revenue may not consider it a true lease. The answer: If you want to buy a machine you've had on lease, buy it at its fair market value.

• **Cut Overhead Expenses**—Under leasing, you don't have to spend time on the bookkeeping of buying, depreciating, and selling equipment; the lessor handles those details.

J. W. Lindsey, vice president-purchases, Jones & Laughlin Steel Corp., adds this important consideration: Since leasing is a fixed (not a variable) cost, you should be careful of the amount of leasing payments you obligate yourself for. "What if you built up a tremendous total of fixed rent charges, then your operations dropped to 50 per cent of capacity?" he asks.

The best way to look at leasing is as another source of financing—one that, judiciously used, can take its place alongside other long term borrowing arrangements to give you a profitable financing "mix."

Rebuilding

A department manager wanted a new vertical boring mill. The old one was slow, worn, obsolete. But the company couldn't afford a new one. The manager achieved production efficiency though—by rebuilding. The mill was not just repaired; it was modernized. New drive and feed systems were added; so were new bearings and controls.

That approach to production efficiency is more widespread today than ever before—and many blue chip companies are doing it, reports C. A. Simmons Jr., president, Simmons Machine Tool Corp., Albany, N. Y., a major rebuilder of large tools.

Many machine tool manufacturers will rebuild equipment for you—often for much less than the cost of a new machine. Or you might consider doing it yourself.

Standard Pressed Steel Co., Jenkintown, Pa., does most of its own rebuilding. Every five years (in many cases at one, two, or three year intervals) it examines every major production machine in its plant to see whether rebuilding would improve its efficiency. The company says it can sometimes completely rebuild a machine for as little as 25 per cent of the price of a new machine.

Says Sid Matthews, the firm's machine tool analyst: "We look at it this way: If the base casting of the old machine is the same as that of

Metalworking Looks at Leasing—A STEEL Survey

STEEL questioned 130 metalworking companies about leasing—30 now lease; 100 do not. Here are the questions and answers:

Are you considering leasing?

Only 11 of the 100 are.

If not, why not?

56 say it is "too expensive."

33 say they "would rather own." Reasons for the preference include: 1. Want freedom to make alterations and additions. 2. Want freedom to move equipment anywhere. 3. Desire "the prestige of ownership." 4. Are leery of the stand that Internal Revenue Service may eventually take.

If you do lease, what are the advantages?

Respondents ranked advantages in this order:

1. To free capital for other purposes.
2. To get tax advantages on lease payments.
3. To achieve equipment flexibility necessary to keep facilities modern.
4. To overcome lack of funds for buying.
5. To hedge against inflation.
6. To meet short term equipment needs.

the new model we would buy to replace it, why buy the new machine? We can rebuild the old one to hold close tolerances and add technological improvements at the same time." For example, it has added automatic lubricators to old centerless grinders. The firm has its own machine design section in its engineering department.

It sometimes reworks a new machine—before putting it into production. And it always tries to operate a machine at top capacity—sometimes far above the manufacturer's rated capacity. Example: On one machine, the maker recommended 1.5 seconds idle time between strokes. Standard Pressed Steel reworked it to run at 0.9 second total time (idle time plus stroke time). It has been running at that rate for eight years and hasn't required rebuilding yet. Says Mr. Matthews: "Some equipment makers don't know how much quality they are building into their products."

Buying Used Equipment

Buying a used production machine is somewhat like buying a used car. Both cost less than new models; both generally lack the latest features; both may be less reliable and less efficient than new units. But both can substantially improve your present situation. In either case, investigate the dealer's reputation; check availability of parts; inspect and test the item.

• **Where to Buy**—You can get used metalworking equipment from 225 members of the Machinery Dealers National Association (in 45 cities in 25 states), some 100 dealers not affiliated with the association, and 500 to 600 brokers. A membership directory is available, free. (Write to Machinery Dealers National Association, 1346 Connecticut Ave. N. W., Washington 6, D. C.) Members are obliged to follow a code of ethics which prohibits misrepresentation of a machine's condition, specifications, and accessories, and which forces them to refund the purchase price for any guaranteed machine which proves mechanically unsatisfactory within 30 days of shipment.

The association operates a perpetual inventory system which provides each member with data on major equipment available from other members. Some sell more than half their volume through other dealers.

• **Depreciation Drawback** — The government is even less lenient on the depreciation of used machines than on new ones. However, the Small Business Tax Revision Act permits an initial 20 per cent allowance on the first $10,000 of the cost of used machines which have useful lives of at least six years—if purchased after Dec. 31, 1957.

Contracting Out

You can sometimes avoid investing in equipment by contracting for the manufacture of parts or products. Find a supplier with a highly mechanized plant and hire his production efficiency. Dr. E. O. Malott, State College, Pa., financial consultant, told an American Management Association seminar that the unit cost is usually higher, but your net may be as great or greater because of savings in overhead and financing costs. But you may run into other problems: The contract manufacturer may demand a large volume of production at one time and you'll be forced to assume the cost of inventory, insurance, and storage.

Production Efficiency

Others Get It with Depreciation Reform . . . Why Not Us?

On Apr. 18, STEEL will show why we need reform of the kind already granted our industrial competitors abroad. For a free copy of any or all articles in the Program for Management (running every other week since Jan. 11), write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this. For details, see Pages 5 and 6.

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Only at Carlson can you buy so many grades of stainless steel in the wide variety of shapes and sizes illustrated here. We regularly process such complete bill-of-material orders. Trained Carlson men, with years of experience and practical knowledge, are determined to give you the best and most efficient service possible.

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STAINLESS STEEL PLATE . . . rolled to almost any size or thickness, 3/16" and heavier, to meet your individual needs—whether rectangles, circles or special patterns. Substantial tonnage in Types 302, 304, 304-L, 309, 309-S, 310, 316, 316-L, 317, 317-L, 321, 347, 348, 405, 410, 430 and 502-½% Mo. is available for prompt delivery. In addition, two precipitation-hardening grades, Types 17-4 PH* and 17-7 PH* are now in production.

STAINLESS STEEL HEADS . . . in Types 304, 304-L, 316 and 316-L are available from stock in ASME and Standard specifications (10" to 72" diameter). A large assortment of dies is available for pressing other types of heads and special sizes can be spun where practical.

STAINLESS STEEL FORGINGS and SPECIAL PATTERNS . . . including tube sheets, flanges, circles, rings, sketch plates and other specialties can be produced to specification on our versatile equipment.

Also STAINLESS STEEL BARS AND SHEETS (No. 1 Finish).

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IT'S LIGHTER THAN YOU THINK!

WHEN DIE CAST with ZAMAK®

These tiny zinc die cast electrical contact socket cups have a minimum wall thickness of .005″— **the thinnest wall section ever die cast.** Designed by Omaton Division of BURNDY CORPORATION, they more than meet Government specifications and are adaptable for many types of solderless multi-contact connectors.

It takes 10,371 of the smallest cups to weigh a pound and they are 20% lighter than the ones formerly made from drawn steel. Each is precision die cast to a remarkable degree of uniformity and accuracy, despite the complex design.

Such extremely thin-wall sections—possible only with zinc die castings—**frequently eliminate competition from all other materials and production methods.** In addition, ZAMAK zinc die castings provide many more advantages —and all at lower cost.

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HORSE HEAD PRODUCTS®

Autodom's Steel Requirements Shift

Chrysler Executive Points to . . .

More coil steel used

Cold forming increases

Lighter gages for unit bodies

MAURICE F. GARWOOD
Chief Materials Engineer

UNITIZED BODIES are changing gage specifications for steel in underbody components. Frame sections formerly made from 0.078 to 0.109 in. stock now are fabricated from 0.060 to 0.090 in. steel. Weight and cost reductions dictate the use of even lighter gages, claims Maurice F. Garwood, Chrysler Corp.'s chief materials engineer.

Discussing the changing requirements for automotive steel, Mr. Garwood adds that automated press lines have caused the industry to switch almost completely from cut sheets to coil steel for stamped parts. "Coil steel has replaced cut lengths in 95 per cent of the applications employed in Chrysler's Stamping Div., although cut lengths still are used on small volume parts produced by our Parts & Equipment Div.," he says.

Aluminum killed steels will be used more for auto parts. The complex shapes of car designs call for steels with uniform drawing qualities. The increased use of stampings in functional, stressed components has placed a premium on uniformity of structure, response to heat treatment, and freedom from flaws which would act as stress risers in these components, Mr. Garwood explains.

• **Bar Stock**—"Carbon steels are replacing alloy steels in an increasingly large number of applications requiring bar stock," reports Mr. Garwood. He says improvements in induction and flame hardening methods have made it possible for Chrysler to specify carbon bars for almost all induction hardened parts. Exceptions include truck axle and steering gear shafts. It's still impractical, however, to adopt present induction hardening methods to handle large differential and manual transmission gears. Those probably will continue to be made from alloy steels.

"Another reason why carbon steels are preferred is the superior rate of carbide solution during rapid heating. Complex carbides are harder to dissolve and are detrimental to obtaining maximum hardness, but plain carbon steels containing relatively small amounts of carbide forming alloys are easier to get into solution and give superior hardnesses in relatively short heating cycles," declares Mr. Garwood.

• **Cold Forming** — With different types of steel come different forming methods. Mr. Garwood believes cold forming is the most significant and most promising. Cold extruding, particularly, will advance as larger presses, dies, die lubricants, and general technology improve. Cold extruded parts already have replaced hot forgings and machined parts in a large number of applications.

Adds Mr. Garwood: "Cold forming of high carbon steels is increasing rapidly through the use of pro-

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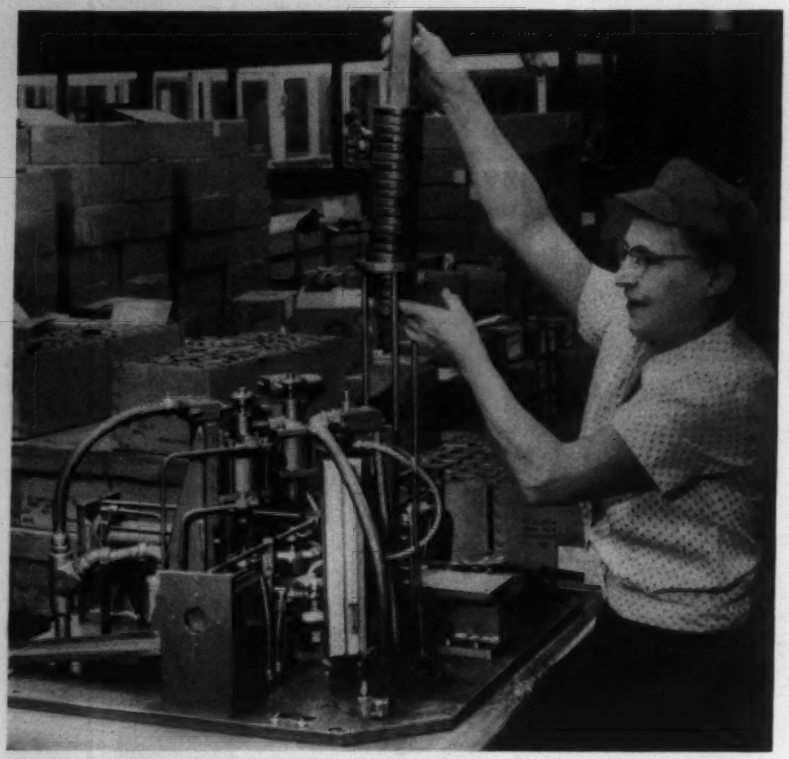

LIP SEALS, used to retain lubricants in auto wheel bearings, rear axles, and transmissions, are inspected electronically in the Sealector designed by GM's research laboratories. Seals fed into the machine are checked for high and low limits and lip pressure; those that are eccentric, faulty, or out of specification are automatically rejected

prietary annealing cycles. Extrusion of carbon steel shafts produces parts having core properties equivalent to those formerly obtained by heat treating alloy steels. Selective hardening is often used to impart the required surface hardness to these parts without damaging core properties."

• **New Steel**—Although automakers are attempting to cut down on the variety of steels they use, the industry is looking closely at a new carburizing steel tentatively designated as SAE 4226. It contains 0.22 to 0.29 per cent carbon, 0.70 to 1.00 per cent nickel, and 0.15 to 0.25 per cent molybdenum. Mr. Garwood says core hardenability data are available on more than 40 production heats. Case hardenability studies will be finished within a few weeks.

• **Heat Treat**—Carbonitriding, suspended carburization, and high temperature carburizing have helped improve steel quality and are factors making it possible to use cheaper carbon steels for smaller, low stressed parts. Those processes have limitations. Mr. Garwood points out that while carbonitriding permits lower furnace operating temperatures, he feels the process still isn't completely understood. "Gas and temperature controls should always be employed for best results."

High temperature carburizing is faster than older case hardening methods, but Mr. Garwood says his experience has shown the process presents grain growth problems; therefore it isn't much favored for direct quenched parts. Suspended carburization, which permits parts to be held in a carburizing atmosphere without altering characteristics by heat treating, provides opportunity for cost savings because heat treat furnaces can be shut down for long time periods without having to take out the parts.

GM Reports on Suppliers

General Motors Corp. made purchases from 27,500 suppliers in 1959, about 2000 more than in 1957, reports John Gordon, president. Last year, GM paid its suppliers $5.5 billion.

Although GM doesn't stress this, it appears that it's losing some of its larger suppliers, possibly as the result of increased captive operations. The company reports 3400 more firms employing less than 100 persons have been added to its supplier lists. Yet, its total increase in venders is reported as "nearly 2000." Apparently 1400 suppliers who employ more than 100 persons each have been dropped. The "under 100" category lists 19,800 firms. Some 12,300 of them have fewer than 25 employees.

Reports from Rumor Circuit

Detroit Transmission Div., General Motors Corp., will turn a small part of its Slimjim Hydra-Matic transmission output over to Vauxhall and Opel so the cars GM builds overseas will be able to sport automatic shifts too.

Reporting to a Milwaukee dealer group, Edward N. Cole, Chevrolet's general manager, said the 1961 Chevy will be easier to get into and more comfortable to sit in. Autodom takes this to mean that Chevrolet (like the rest of GM) is eliminating the dogleg next year and is adopting a new seating arrangement.

U. S. Auto Output

Passenger Only	1960	1959
January	688,731	545,757
February	659,323	478,484
2 Mo. Totals	1,345,054	1,024,241
March		576,085
April		578,825
May		546,817
June		557,994
July		555,418
August		239,152
September		258,157
October		507,530
November		254,527
December		494,931
Total		5,593,677

Week Ended	1960	1959
Feb. 27	153,501	127,783
Mar. 5	138,513	133,540
Mar. 12	145,967	134,283
Mar. 19	145,852	135,466
Mar. 26	137,241†	121,832
Apr. 2	138,000*	133,878

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Photo courtesy of Heintz Division—Kelsey Hayes Corporation

Aristoloy meets severe cold extruding requirements on track bushings for Caterpillar Tractor Company

On the backward extrusion of this track bushing a 3 x 5-inch hollow blank is extended to 8 inches in a single blow. For uninterrupted flow of production, chemical and physical uniformity of the material is essential.

On thousands of parts Aristoloy electric furnace steel has fulfilled the stern production requirements of cold extruding.

Controlled melting of selected scrap, careful rolling and precise heat treating and finishing, this is why Aristoloy is so ideally suited to high volume production where rejects caused by material faults and deficiencies can be so costly.

For complete information about Aristoloy leaded or standard carbon, alloy and stainless grades, call the Copperweld representative in your nearest large city . . . or write today for NEW PRODUCTS & FACILITIES CATALOG.

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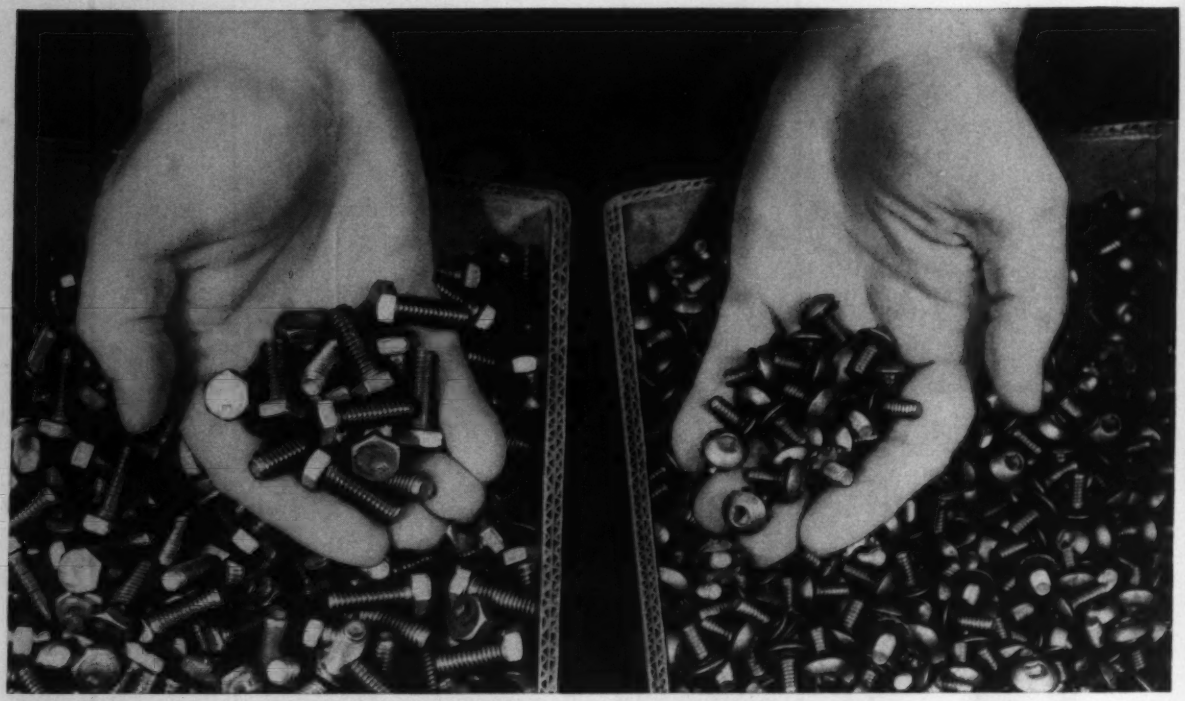
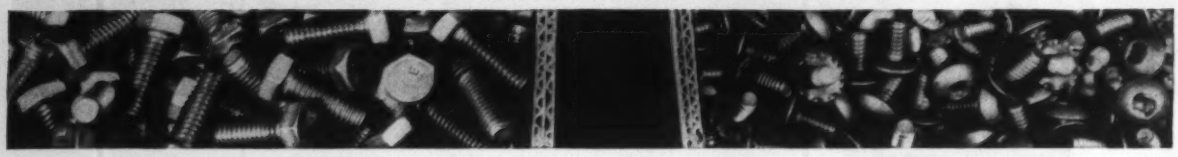


Picks up $97,000 saving in screws



Fastener survey by RB&W cites big saving in simple substitution of fastener types ... no engineering changes needed

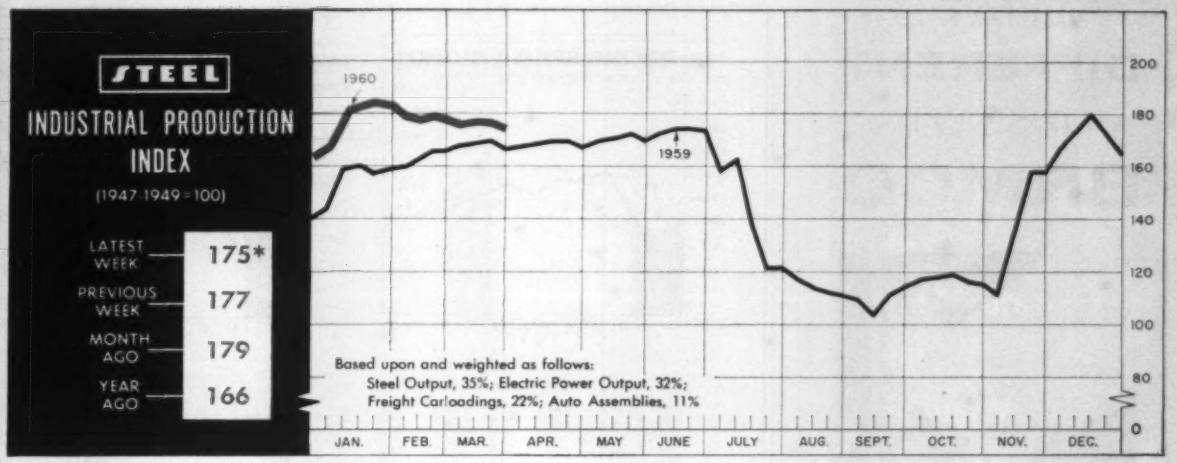
There were no engineering changes at all involved in this hard-to-believe case of cost reduction. The RB&W Fastener Man, called in to survey the use of fasteners in this particular company's machine, was asked to submit recommendations on a size for size substitution only.

Annual production consumed about 1½ million fasteners. Since the RB&W fastener specialist saw neither a design nor appearance reason for the costly alloy fasteners being used, he suggested (1) clutch head screws to replace the existing alloy screws; (2) standard bright and high carbon hex screws to be used at all other locations. Just that simple. At prevailing prices, costs of parts studied totaled $120,000; cost of the suggested fasteners: only $23,000 . . . a whopping, realizable $97,000 saving. Pure profit!

Are you *sure* you're not wasting fastener dollars? True, the savings offered may be more modest than the special case above. But they're certainly worth looking for through the eyes of an RB&W fastener expert. No obligation. Write Russell, Burdsall & Ward Bolt & Nut Company, Port Chester, New York.

RB&W
115th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.



*Week ended Mar. 26.

'60 Outlook Thawed by Retail Sales

A BREATH OF SPRING in the air, and a second look at an important gage of the business climate produced some warming near the end of March in 1960 forecasts which had turned frigid since the start of the year.

The spring air, breaking the grip of record-setting cold spells across the nation, has been eagerly awaited by watchers of the economic temperature. In it, they foresee a renewed flow of freight carloadings, new car sales, steel consumption, and retail trade. In the retail sales segment, economists are seeing a warming trend which could start the business indicators up toward the sizzling levels predicted for the year.

• **For the Record**—Department of Commerce retail sales figures, a host of demand and attitude indicators, show that consumers were never more confident, in the first two months of a year, in the direction of the economy. Consumer spending at retail for clothing, food, household durables, and automobiles set new records for the month in February. Sales rose to $15.8 billion, a gain of 5.5 per cent over the previous February peak recorded a year ago.

In addition, revised Commerce figures for January retail trade show that month too topped the 1959 level for a new monthly record. Together, the two months totaled more than $32 billion, 3 per cent above the previous peak in the 1959 period.

• **Consumer Buying**—Retail spending by the consumer is an effective bellwether of attitude because:

1. In the case of durable goods, the consumer must be confident of continuing high income to pay for them.

2. Consumer studies show he spends both after his income goes up and in anticipation of rising income.

Economists feel the current

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,527[1]	2,597	2,638
Electric Power Distributed (million kw-hr)	13,900[1]	14,109	12,709
Bituminous Coal Output (1000 tons)	8,725[1]	7,750	8,139
Crude Oil Production (daily avg—1000 bbl)	7,100[1]	7,116	7,193
Construction Volume (*ENR*—millions)	$453.5	$374.1	$356.3
Auto, Truck Output, U. S., Canada (*Ward's*)	176,496[1]	183,563	155,171
TRADE			
Freight Carloadings (1000 Cars)	585[1]	581	604
Intercity Truck Tonnage (changes from year ago)	−1.3%	+0.4%	+19.6%
Business Failures (Dun & Bradstreet)	302	290	292
Currency in Circulation (millions)[3]	$31,671	$31,726	$31,231
Dept. Store Sales (changes from year ago)[3]	−6%	−7%	+17%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$27,169	$26,445	$24,865
Federal Gross Debt (billions)	$289.1	$290.4	$282.4
Bond Volume, NYSE (millions)	$26.3	$25.3	$22.8
Stocks Sales, NYSE (thousands of shares)	13,594	12,948	12,876
Loans and Investments (billions)[4]	$103.5	$102.2	$103.9
U. S. Govt. Obligations Held (billions)[4]	$25.1	$25.1	$32.9
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	231 0	231.3	220.8
All Commodities[7]	120.1	120.0	119.3
Commodities Other than Farm & Foods[7]	128.7	128.7	127.8

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,844,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1938-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

WHAT'S
DIFFERENT
ABOUT
BRMCO

At BRMCO, each order receives the careful, individual attention that ensures quality and uniformity. And, no order is considered complete until the customer has used every pound of BRMCO brass, bronze or aluminum to his utmost satisfaction.

Whatever the requirements, BRMCO specializes in providing metals – in strip or rolls – to meet the most exacting specifications. In fact, BRMCO excels in maintaining tight tolerances on temper, grain size, and dimensional requirements.

BRMCO also provides metallurgical assistance, specific date delivery, and special packaging and shipping arrangements to accommodate your handling equipment.

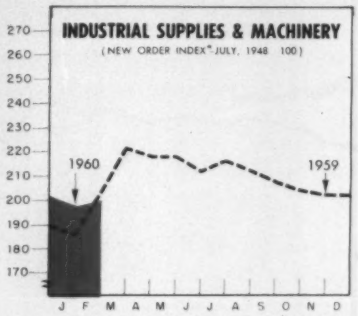
See for yourself the greater efficiency and lower metal working costs that BRMCO makes possible.

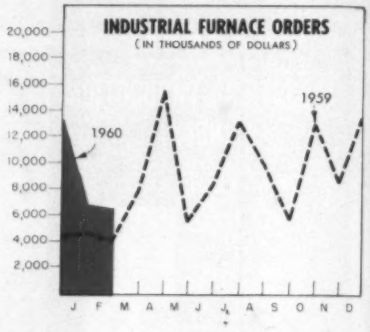
We'll be happy to send you samples for your own testing and analysis. Simply write, or call collect.

BRMCO

Bridgeport Rolling Mills Company
BRIDGEPORT, CONNECTICUT
Subsidiary of Atlantic Coast Industries, Inc.
FINE QUALITY ALUMINUM, BRASS AND BRONZE IN STRIP AND ROLLS

THE BUSINESS TREND





	1960	1959	1958	1957
Jan.	198	186	163	221
Feb.	200	202	157	219
Mar.	...	221	149	210
Apr.	...	218	148	203
May	...	218	152	199
June	...	212	164	199
July	...	216	170	197
Aug.	...	212	172	197
Sept.	...	207	178	203
Oct.	...	204	187	192
Nov.	...	202	189	180
Dec.	...	202	190	167

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs.' Assn.
Charts copyright, 1960, STEEL.

	1960	1959	1958*
Jan.	6,827	4,545	3,047
Feb.	6,499	3,596	3,684
Mar.	....	7,842	2,871
Apr.	....	15,517	3,572
May	....	5,315	954
June	....	8,230	3,672
July	....	13,141	5,169
Aug.	....	9,738	3,533
Sept.	....	5,560	4,846
Oct.	....	12,967	3,105
Nov.	....	8,442	5,597
Dec.	....	13,437	4,284

*Does not include industrial ovens.
Industrial Heating Equipment Assn. Inc.

splurge is more than usually secure, since increased buying of automobiles and other hard goods has not diminished the volume of smaller value purchases in department stores. In February, such major lines as food, furniture and appliances, lumber, building materials, and hardware all showed gains over a year ago. Department store volume in February rose 8.3 per cent over the year earlier month.

Retail volume in March probably didn't match the pace of the first two months because of widespread winter storms; auto sales, however, are running comfortably ahead of year-ago levels.

• **Pace Quickens**—The return of near normal weather in the Mar. 11 to 20 period boosted sales of domestic-built autos 15.3 per cent above the Mar. 1 to 10 daily rate, says *Ward's Automotive Reports*. "It also brought sales since Jan. 1 to 9.9 per cent above the 1959 period and 35.4 per cent above the 1958 level."

Over-all, consumer spending seems poised to lend the same sort of buoyance to the 1960 economy as will record levels of capital goods spending projected throughout the year.

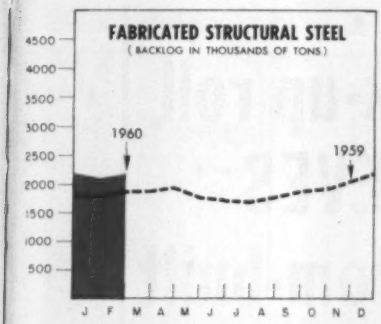
Industry Rebuilds Stocks

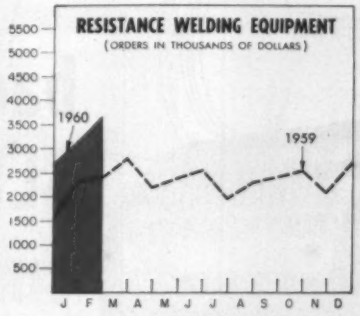
Manufacturers increased the book value of their inventories 7.5 per cent above year-ago levels in December and January, reports the Commerce Department in its *Survey of Current Business*, while sales expanded nearly 10 per cent during the period. The inventory buildup, designed to restore metal stocks and meet the needs of higher production, added $3.5 billion to inventory book values.

Stock-sales ratios at the end of January were the lowest in ten years among producers of electrical, nonelectrical, and industrial machinery. About 75 per cent of the additions to durable goods inventories were in working stocks, about equally divided between purchased materials and goods in process, says the Commerce Department. Finished goods stocks built up rapidly at the end of the year as producers replenished hard-hit shelf stocks.

Are They Too High?

After expanding by about a billion dollars in both December and January, total inventories of manufacturers, wholesalers, and retailers stood at $90.4 billion, seasonally ad-





	Shipments 1960	Shipments 1959	Backlogs 1960	Backlogs 1959
Jan.	209.0	224.3	2,116	1,794
Feb.	240.9	216.1	2,189	1,864
Mar.	....	260.5	....	1,873
Apr.	....	290.6	....	1,922
May	....	294.1	....	1,768
June	....	365.4	....	1,717
July	....	238.6	....	1,679
Aug.	....	220.4	....	1,772
Sept.	....	182.6	....	1,871
Oct.	....	195.3	....	1,891
Nov.	....	180.8	....	2,068
Dec.	....	235.7	....	2,195
Total	....	2,904.4		

American Institute of Steel Construction.

	Net Orders 1960	Net Orders 1959	Shipments 1960	Shipments 1959
Jan.	3,258	2,396	1,582	1,427
Feb.	3,732	2,457	2,563	1,889
Mar.	....	2,811	....	2,179
Apr.	....	2,258	....	2,193
May	....	2,407	....	2,019
June	....	2,597	....	2,702
July	....	1,980	....	2,269
Aug.	....	2,322	....	2,928
Sept.	....	2,435	....	2,113
Oct.	....	2,599	....	2,097
Nov.	....	2,131	....	1,597
Dec.	....	2,768	....	2,353
Totals	....	29,161	....	25,766

Resistance Welder Manufacturers' Assn.

justed. That was a gain of more than 2 per cent in only two months, to the highest level reached in the last two years, including the recession and recovery.

The inventory upturn, observes the Federal Reserve Bank of Cleveland, raises the question of excessive stocks vs. adequate inventory levels. Economists wonder if the cutbacks in steel and auto production mean these industries are the first to recognize a dangerous inventory situation.

• **Test of Time** — By historical standards, points out the bank, inventories are on the low side when related to sales volume. The seasonally adjusted total of business sales in January was $61.3 billion, an inventory-sales ratio of 1.475. That ratio is about the same as that which existed throughout last year; higher ratios, with inventories equivalent to more than 1.5 times total current sales, have often prevailed in recent years. For example, says the bank, in only five months in the seven years between 1952 and 1958 were inventories less than 1.5 times sales.

Those figures should dispel any concern that widespread inventory troubles may be in the making, but they do not rule out the possibility of maladjustments in individual product lines.

A loose comparison can be made of year to year growth in the dollar volume of retail sales vs. production indexes for consumer goods. In the first two months of this year, retail sales increased almost 4 per cent above the year earlier period. However, production of consumer goods rose nearly 9 per cent from a year earlier. Except for the short term aim of rebuilding depleted stocks of consumer goods, that relationship cannot be continued indefinitely, notes the bank.

• **A Better Balance**—"The individual items of consumer goods production that seem most out of line are autos and appliances. With output of those goods up 34 per cent and 28 per cent, respectively, from a year ago, sales have increased only about 12 per cent in the case of autos and only nominally in the case of appliances.

"The adjustments being made in these lines and that have been reflected in the industrial production index are a step toward restoring a better balance between production of consumer goods and retail sales." The FRB index stood at 110 (1957=100) at the end of February.

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Yes, *life* often rests on the dependability of the fastener.

Whether for bridges, pressure piping, skyscrapers, railroads, transformers or tunnels . . . or even your personal car, it's the *dependability of the fastener* that counts. The fastener must be *stronger . . . more dependable* than the part.

When you visit our manufacturing facilities and control laboratories, you will see for yourself how we build dependability into our IMPACT-FORM'D nuts, bolts and screws.

IMPACT-FORM'D Screw and Bolt fasteners are produced to customer demand every day:

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- high strength heat treated bolts for heavy construction
- close tolerance components for machinery
- screws for electronic equipment and accessories

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SCREW AND BOLT CORPORATION OF AMERICA P. O. Box 1708 Pittsburgh 30, Pa.

DIVISIONS: *Pittsburgh Gary · Southington Hardware American Equipment*

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work to your over-all cost advantage

Heppenstall and Midvale-Heppenstall Back-Up Roll Sleeves reflect the long experience of two pioneer sleeve producers. These sleeves enable you to roll record tonnages . . . decrease downtime . . . and effect over-all cost reduction. They give longer working life in today's high-speed mills because their up-to-the-minute design permits utilization of more effective forging and heat treating operations. Each sleeve's working surface is *tempered to meet your exact hardness specification.*

These mandrel-forged sleeves — made from highest quality alloy steel — are worked thoroughly under modern hydraulic presses to produce a finished product having both maximum density and grain refinement. In addition, they offer you exactness of fit and greater resistance to cracking and spalling during high-speed rolling.

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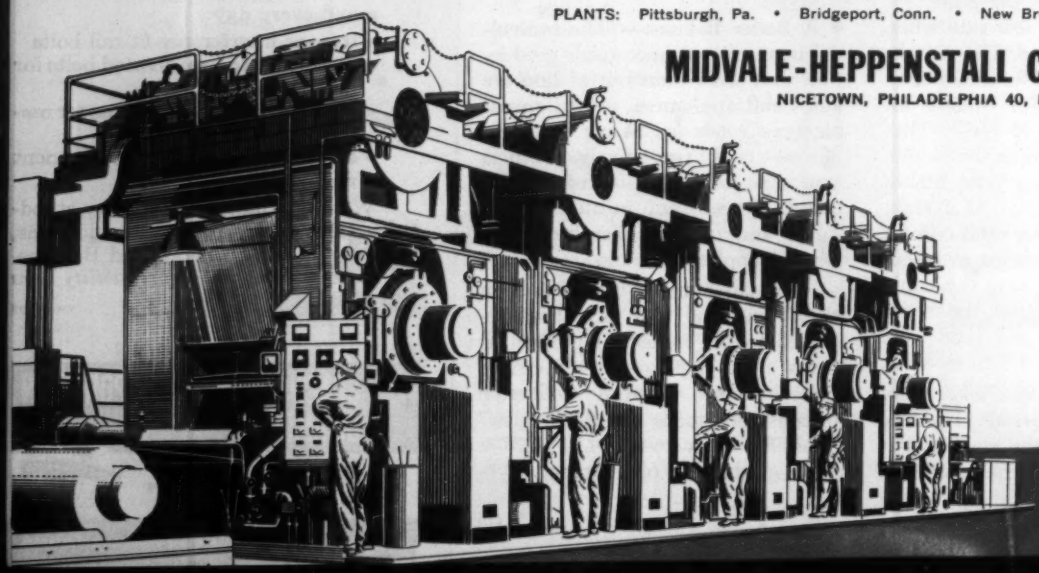


CHARLES B. EISENHAUER
Van Norman div. gen. mgr.

R. M. HADCOCK
Republic Steel supt.

ELMER E. RICHARDSON
Heppenstall plant mgr.

NORMAN E. SHIPLEY
Thomas Wks. sales mgr.

Charles B. Eisenhauer was named general manager, Electronics Div., Manchester, N. H., **Van Norman Industries Inc.** He was director of manufacturing at Continental-Diamond Fibre Corp.

R. M. Hadcock was appointed superintendent, Blast Furnace Dept., at **Republic Steel Corp.'s** Warren, Ohio, plant. Former assistant superintendent, he succeeds **K. G. LeViseur,** retired. **H. W. Ritter** succeeds Mr. Hadcock.

H. Wallace Rowles was made manager of structural and plate products for **United States Steel Corp.,** Pittsburgh, to succeed **Loring S. Brock,** named executive vice president, U. S. Steel Products Div. Former assistant manager, Mr. Rowles is replaced by **Dale L. Armstrong.**

Ken C. Thomas fills the new post of vice president-manufacturing and engineering, **Armco Drainage & Metal Products Inc.,** Middletown, Ohio. He is replaced as manager, Great Lakes Div., with headquarters at South Bend, Ind., by **G. Russell Betts.**

Edward O. Johnson was made chief engineer, RCA Semiconductor & Materials Div., Somerville, N. J., **Radio Corp. of America.**

S. P. Terlecky was promoted to manager-wire braid hose sales, **Republic Rubber Div.,** Lee Rubber & Tire Corp., Youngstown. He succeeds **J. A. MacIntire Jr.** who last November was made general sales manager.

Elmer E. Richardson was made manager of the Bridgeport, Conn., plant of **Heppenstall Co.** He succeeds **Glenn F. Whiteley.** Mr. Richardson was plant superintendent.

Alfred B. Thacher fills the new post of manager of sales engineering for **Hamilton Standard Div.,** United Aircraft Corp., Windsor Locks, Conn.

Robert E. Groening was made general sales manager of **United Welders Inc.,** Bay City, Mich.

Harry R. Bentley was named plant manager of **Chrysler Corp.'s** Trenton, Mich., engine plant.

Clarence Bennett was made sales section head of the Welder Product Group at **Vickers Inc.,** Electric Products Div., St. Louis.

Singmaster & Breyer Inc., New York, an affiliate of Fluor Corp. Ltd., Los Angeles, appointed **Byron Marquis** president. He was vice president-engineering. **William H. Finkeldey,** former president, was made chairman to succeed **Frank G. Breyer,** now chairman of the advisory committee.

Stanley K. Kifer was made division superintendent, welded pipe mills, at the Lorain, Ohio, Works of **National Tube Div.,** U. S. Steel Corp. Reporting to him are: **David C. Kerr,** superintendent, hot mills; **Lewis L. Briggs,** superintendent, finishing mills; and **Harold Z. Llewellyn,** superintendent, maintenance.

Norman E. Shipley was made sales manager for **Thomas Works,** H. K. Porter Company Inc.'s Delta-Star Electric Div., Lisbon, Ohio. He was manager of Delta-Star's Baltimore district office.

Daniel C. McCarthy was named administrative vice president, **Pratt & Whitney Co. Inc.,** West Hartford, Conn. He was assistant comptroller at Mobil Oil Co.

Stanley H. Maikowski was made general superintendent of manufacturing, Hartford, Conn., Div., **Emhart Mfg. Co.**

Ray C. Wing was made sales manager, Metalworking Machinery Div., **Oliver Machinery Co.,** Grand Rapids, Mich.

William F. Humphrey was made director of sales, Marine & Industrial Engine Div., **Chrysler Corp.,** Detroit. He was sales director at Hercules Motor Corp. He succeeds **L. E. Nelson** who rejoins Chrysler's Automotive Sales Group.

Howard D. Langley was made marketing manager-motor control at **Federal Pacific Electric Co.,** Newark, N. J. He was chief engineer of Square D Ltd. of England.

Stanley Abkowitz was made manager-refractory metals product development, Metals Div., **Kelsey-Hayes Co.,** New Hartford, N. Y.

Francis A. Bormuth, secretary, **Seneca Wire & Mfg Co.,** Fostoria, Ohio, was elected vice president. **Eugene F. Howard,** general coun-

FRED MAYTAG II

GEORGE M. UMBREIT

Maytag chairman and president

JOHN M. HOTTENSTEIN

JOHN R. CHAMBERLIN

I-T-E new management posts

sel, was also elected vice president and assistant secretary.

Fred Maytag II was named chairman and chief executive officer of **Maytag Co.**, Newton, Iowa. He is succeeded as president by **George M. Umbreit**, executive vice president-treasurer. **E. G. Higdon** succeeds Mr. Umbreit and is in turn succeeded as comptroller by **N. C. Carlsen.**

James M. Dill was named to the new post of special products sales manager, **Russell, Burdsall & Ward Bolt & Nut Co.**, Port Chester, N. Y.

Don Greenberg was named chief engineer of **Barnes Drill Co.**, Rockford, Ill. He was a sales engineer in the Honing Dept.

Arthur L. Koehler was appointed manufacturing manager of **Sorensen & Co.**, South Norwalk, Conn., subsidiary of Raytheon Co. Now in charge of production in New York and South Norwalk plants, he previously was production manager, South Norwalk.

John M. Hottenstein, formerly manager of the switchboard section, Switchboard Div., **I-T-E Circuit Breaker Co.**, Philadelphia, was named manager, Kelman Power Circuit Breaker Div., Los Angeles. He succeeds **A. E. Mackenzie**, recently named to the new corporate post of vice president-power equipment. **John R. Chamberlin**, previously manager of the circuit breaker section, Switchgear Div., suceeds Mr. Hottenstein. **William P. Bolger** was made manager, Special Products Div., Philadelphia, and is succeeded as manager, Small Circuit Breaker Div., by **W. Harold Edmunds**, formerly that division's chief engineer.

Alfred A. Smith was made sales manager, Expanded Metal Div., **Penn Metal Co. Inc.**, Parkersburg, W. Va. He replaces **R. P. Ingols**, resigned.

H. D. MacMaster was made plant manager, **Keystone Abrasive Wheel Co.**, Carnegie, Pa. He has been identified with the resin field, specifically in the use of resins in grinding wheels, for many years.

Dwight N. Wait was named general manager of **Kemet Co.**, Cleveland, a division of Union Carbide Corp.

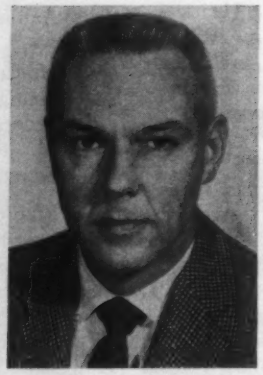
Jessop Steel Co., Washington, Pa., named **James L. Daniell** vice president-general administration. He was executive assistant to the president at Jessop and president of Green River Steel, Jessop subsidiary at Owensboro, Ky., which post he continues. **A. J. Kueber** was named vice president of Jessop in charge of its steel service centers. He is president of Steel Warehousing Div. in Chicago. **Frank W. Martin** was elected secretary-treasurer.

George J. Haislmaier was named general sales manager, Automotive & Industrial Div., **Modine Mfg. Co.**, Racine, Wis. **Peter J. Kohler** was made western sales manager, Automotive Div.

Conax Corp., Buffalo, named **War-**

DON GREENBERG

Barnes Drill chief eng.



ARTHUR L. KOEHLER

Sorensen mfg. manager

H. D. MacMASTER

Keystone Abrasive plant mgr.

GEORGE J. HAISLMAIER

Modine Mfg. Div. sales

- Allied Fuel Oils serve Mid-America, the world's most important manufacturing area.
- You get the experienced sales and technical services from a team of fuel oil specialists!
- You get the exact fuel oil you need—delivered when you want it—in any quantity by lake tanker, river barge, tank car or truck transport!

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JOHN G. PETRY
Joyce-Cridland post

JOSEPH F. KERIGAN
Chrysler-Stamping gen. mgr.

CECIL E. VANCIL
Electric Autolite v. p.

JACK B. TRUSSEL
Mobilift sales manager

R. JOHNSON
Dreis & Krump v. p.

GRAEME B. SUPPLE
ASID promotion

ren L. Jones to the new post of sales manager, industrial products.

Jack B. Trussel, president of Industrial & Marine Power Co., Indianapolis, was named sales manager of **Mobilift Co.**, Hopkins, Minn., division of Minneapolis-Moline Co.

John W. Lindsay was made North Central regional product sales manager for **Denison Engineering Div.**, American Brake Shoe Co. He is in Cleveland.

Milton B. Henderson was made customer service metallurgist, Metallurgical Dept., **American Steel & Wire Div.** at Detroit, U. S. Steel Corp.

Ivan G. Easton was made vice president-engineering, **Harold M. Wilson** vice president-manufacturing for **General Radio Co.**, West Concord, Mass.

Richard G. Whitlock was promoted to assistant sales manager, **W. W. Sly Mfg. Co.**, Cleveland.

R. Johnson was made vice president-general sales manager, **Dreis & Krump Mfg. Co.**, Chicago. He was sales manager, Tooling Div.

Graeme B. Supple was promoted to the new post of product manager, heading planning and development for air conditioning (air side) products for **American-Standard Industrial Div.**, Detroit, American Radiator & Standard Sanitary Corp. **T. I. Harriman** was made manager of pricing service, also a new post. **J. A. McCain** replaces Mr. Supple as manager of the division's Great Lakes sales region. **R. W. Dallas** replaces Mr. McCain as manager, Detroit sales office. **R. L. Graham** was named manager of the Los Angeles office.

T. M. Daalhuyzen was named assistant to the president of **Hollaender Mfg. Co.**, Cincinnati.

Coulter & McKenzie Machine Co. Inc., Bridgeport, Conn., appointed **John A. Maltas** assistant chief engineer.

John G. Petry, former western district manager for **Joyce-Cridland Co.**, Dayton, Ohio, was named sales manager of its Industrial Div.

Joseph F. Kerigan, general manager of **Chrysler Corp.'s** Stamping Div., was appointed to the new post of group executive-stamping in the Automotive Mfg. Group, Detroit.

Cecil E. Vancil was elected a vice president of **Electric Autolite Co.**, Toledo, Ohio. Formerly with Clark Equipment Co. as controller of its Industrial Truck Div., Mr. Vancil will be in charge of Autolite's operations planning.

Gerald E. Veino, former assistant to the director of marketing, was made manager of product forecasting and sales analysis for **Dole Valve Co.**, Morton Grove, Ill.

Gerald E. Donovan, vice president-finance, Douglas Aircraft Co., was elected president of **DataGraphic Systems Inc.** This California corporation, formed a year ago, is jointly owned by Douglas and by General Aniline & Film Corp. It develops and markets machines, materials, techniques, and systems in microfilm miniaturization and data handling fields. Mr. Donovan retains his post with Douglas, and as president of Data-Graphic succeeds **Matthew M. Gouger. Francis A. Nivens** of Douglas, fills the new post of vice president-general manager of Data-Graphic, and **Russell S. Ellsworth** was elected vice president-sales and service.

E. E. Moyer was named head of research and development at the Pennsburg, Pa., plant of **C & D Batteries Div.**, Electric Autolite Co. He was director of research at Acme Electric Co.

F. H. Trones was made Midwestern regional manager for **Byron Jackson Pumps Inc.**, Chicago, subsidiary of Borg-Warner Corp.

OBITUARIES...

Carl T. Weitzel, 67, president, **Mechanical Specialties Co.**, Los Angeles, died Mar. 13.

George L. Street Jr., 59, president, **Johnson Forge & Steel Co.**, Richmond, Va., died Mar. 17.

How a nut can make (or break) your reputation

. . . and even bring in re-orders

A nut comes loose. A wheel comes off. And down comes Billy! No great loss, except perhaps to his dignity. But when a lost nut knocks out a rock drill, or a tractor, or a piece of the heavy equipment that *you* make—then what?

Down goes the machine! *Down* goes production—for no telling how long! *And down goes your reputation as a maker of quality equipment!* You can blame it on the nut, but your customer blames *you!*

This kind of embarrassing and costly "Reliability" failure simply cannot occur when you specify Elastic Stop® nuts for critical bolted connections. For no matter how rugged or repeated the shock or impact, no matter how bone-shaking or constant the vibration . . . Elastic Stop nuts *simply will not work loose!*

Elastic Stop nuts with their exclusive, vibration-damping nylon locking inserts are nothing new. They have been widely used for over 20 years by an increasingly large number of quality-conscious manufacturers who have learned that Elastic Stop nuts give built-in insurance against product failure —the kind of reliability that shows up in customer maintenance records and adds up to reorders. Let us send you information showing how manufacturers have protected the reputation of their products with Elastic Stop nuts. Ask for Bulletin 5901. Dept. S47-460, Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.

for the ring **O** *reliability*

ELASTIC STOP NUT CORPORATION OF AMERICA

Packing Cost: 3 cents per ton

One steel strap packages this ten-ton steel coil. The strap is regularly applied in about thirty-six seconds. A Signode Model PN air power stretcher pulls the strap to 1600-pound tension every time; a Signode Model RCN 114 air power sealer applies the seal. There's no waste strap, and the cost of the strap and the seal together is only about 27 cents. The strength and low cost of the steel strapping itself, plus the speed and simplicity of application, rule out any other way of doing the job.

Find out how Signode strapping, tools, and skilled helpfulness with methods can make your product cost less to handle, store, ship and receive. There's no obligation...just call the Signode man near you, or write:

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Bethlehem Steel Expanding Facilities at Lackawanna

BETHLEHEM Steel Co. is expanding its plant at Lackawanna, N. Y. Work is on schedule despite unseasonably cold weather during the last two months.

Structural steel is rising on the site of a new slabbing mill which will supply 45 x 90 in. slabs exclusively for the plant's hot and cold rolled sheet mills. Upon completion of the slabbing mill, the plant's hot mill will have a full range of slab widths from 24 to 75 in., eliminating the need to cross roll slabs to produce greater widths.

The plant now can produce annually more than 2.5 million tons of sheets, strip, and plates.

The slabbing mill installation will include, in addition to the mill, a room to house motors and electrical control equipment, 27 soaking pits for heating ingots to rolling temperatures, and facilities for storing and loading slabs.

Construction of the plant's oxygen station will get underway this spring. It will produce oxygen for hot scarfing in the new slabbing mill.

Foundations have been completed for a new battery of ovens which will increase the plant's annual cokemaking capacity to nearly 3 million tons. A temporary shed has been erected over the foundations to enable construction of the by-product coke ovens to proceed regardless of weather conditions.

The plant will have eight batteries consisting of 535 coke ovens when the new battery starts operating in the fall. The increased supply of coke is needed for fueling the Lackawanna plant's seven blast furnaces.

Makes Inflatable Metal

Wolverine Tube Div., Calumet & Hecla Inc., Detroit, is equipping a 55,000 sq ft plant in the area to produce a new product, inflatable metal "strubing." The plant also will be used for experimental production development of rarer metals that the company has been investigating, says H. Y. Basset, president of Calumet & Hecla. He estimates it will take three to six months to ready the plant for operations.

Plant to Make Batteries

Globe-Union Inc., Milwaukee, is constructing a battery manufacturing plant in Geneva, Ill. Cost of land, plant, and equipment is expected to approximate $2 million, says C. O. Wanvig Jr., president. The 110,000 sq ft facility is expected to be completed by Oct. 1.

Broadens Space Research

National Research Corp., Cambridge, Mass., has established a Space Vacuum Laboratory to provide ultrahigh vacuum testing services for the nation's missile and space vehicle program. The laboratory is equipped with test chambers capable of duplicating pressures at altitudes in excess of 400 miles. Problems such as bearing friction, lubricants, and the behavior of many metals and plastics under those conditions may be studied.

McKee Forms Units Abroad

Arthur G. McKee & Co., Cleveland, has formed an operating subsidiary in Mexico and is forming a similar firm in Brazil. The Mexican subsidiary, A. G. McKee de Mexico SA, will be headquartered in Mexico City. The new firms will engage in the designing, engineering, and building of petroleum and chemical plants overseas.

Plans $2 Million Project

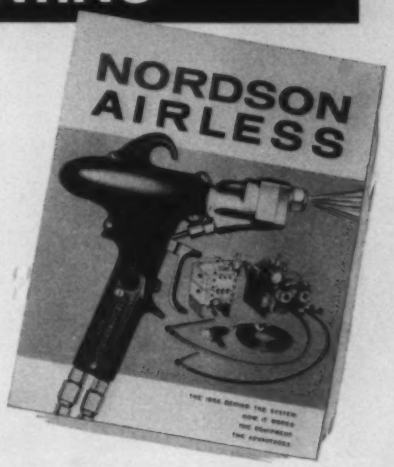
Seiberling Rubber Co., Akron, will spend about $2 million this year to improve production facilities. Most of the money will be spent for new equipment and major revisions of some department operations at its Barberton, Ohio, tire plant. At Copolymer Rubber &

(*Please turn to Page* 124)

if you spend more than $100 per week for paint or other coatings, you should

find out about...

NORDSON HOT AIRLESS SPRAY PAINTING



The Nordson Hot Airless System can save you up to 30% on paint or other coating materials and on labor too! Less expensive spray booths and exhaust systems are needed. Clean up and housekeeping costs are reduced and at the same time finishing quality is improved.

Find out how Nordson Hot Airless can pay off for you, in savings and in improved quality. Write today!

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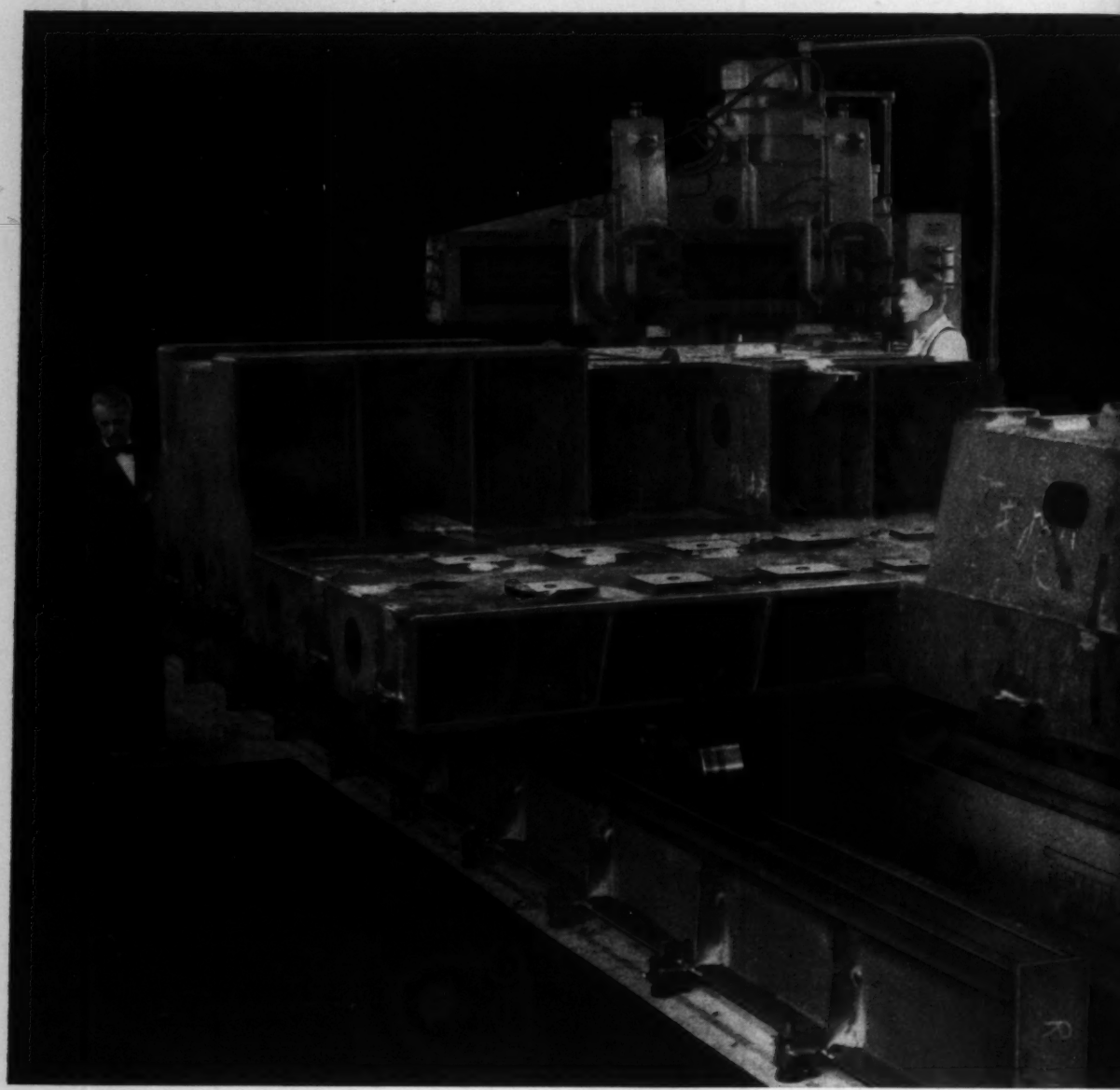
102 Jackson St., Amherst, Ohio

Nothing does the job like a



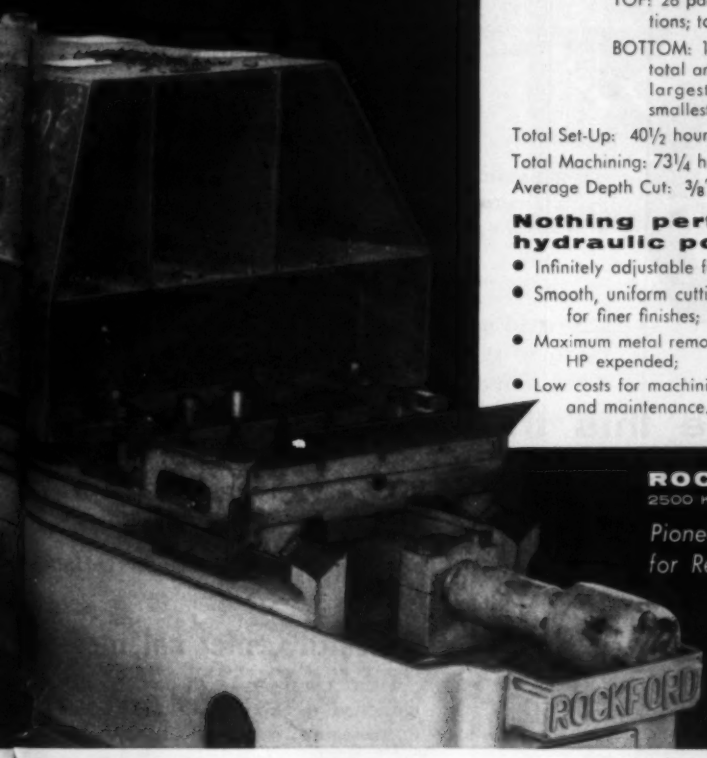
a.

ROCKFORD

HYDRAULIC

PLANER

POTTSTOWN MACHINE COMPANY
MACHINES MORE WORK, AT LESS COST,
THROUGH WIDE SET-UP FLEXIBILITY



SAVES 33% HOURLY COST, 15% TOTAL PRODUCTION TIME ON THIS JOB.

Operation: Using auxiliary rail, planes top and bottom pads on Paper Mill Drive base, 10' 2½" wide x 18' 3¾" long x 3' 5¾" high, weighing 8½ tons.

TOP: 26 pads, 6 different elevations; total area 2806 sq. in.

BOTTOM: 16 pads, one plane total area 3168 sq. in. largest pad, 12" x 54" smallest pad, 4" x 9"

Total Set-Up: 40½ hours

Total Machining: 73¼ hours

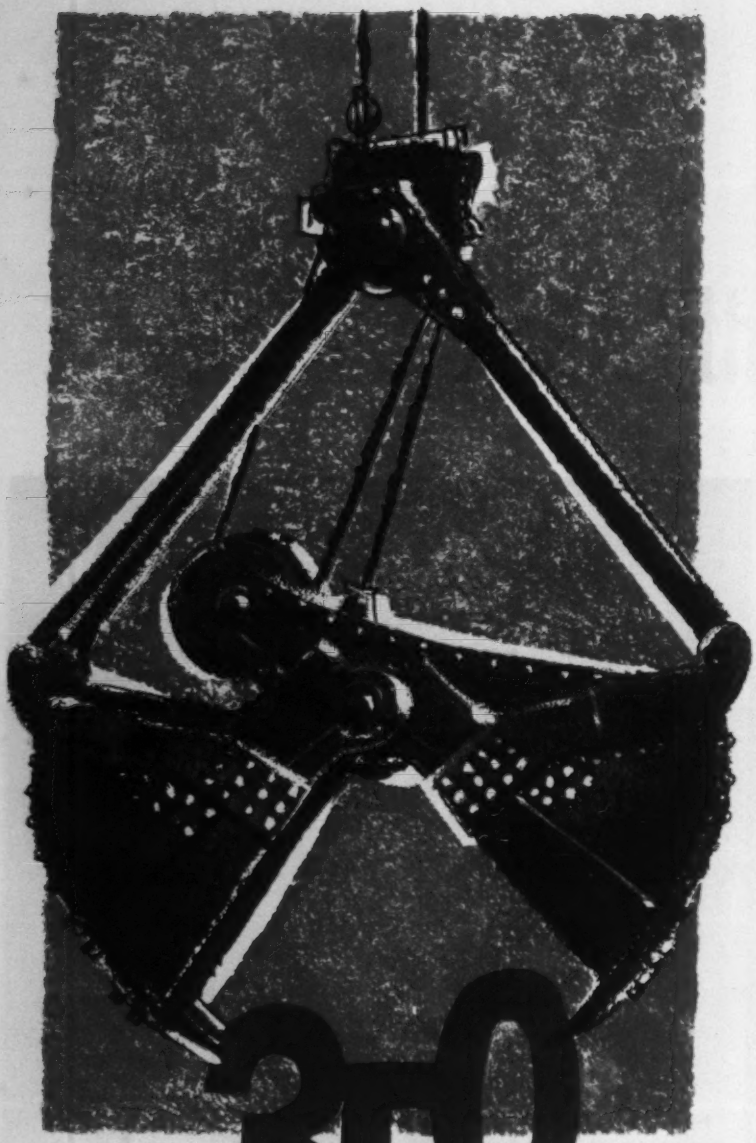
Average Depth Cut: ⅜"

Nothing performs like hydraulic power:

- Infinitely adjustable feeds and speeds;
- Smooth, uniform cutting pressures for finer finishes;
- Maximum metal removal per HP expended;
- Low costs for machining, cutting tools and maintenance.

ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

Pioneers In The Use of Hydraulic Power for Reciprocating Machine Tools



sizes and types make this the most complete line of Clamshell Buckets anywhere. Write for free illustrated catalog. Blaw-Knox Equipment Division, Pittsburgh 38, Pa.

BLAW-KNOX
Clamshell Buckets

(*Concluded from Page* 121)

Chemical Corp., Baton Rouge, La. (synthetic rubber producer partly owned by Seiberling), an $8 million expansion project is underway.

Chemical Firm Formed

Pittsburgh Coke & Chemical Co., Pittsburgh, has formed a subsidiary, Pittsburgh Chemical Co., through consolidation of its three chemical divisions. The new firm plans to spend about $7 million for plant expansions this year. The program includes a plant near Ashland, Ky.

Officers of Pittsburgh Chemical Co. are: President, W. K. Menke; executive vice president, Henry Avery; vice president and general manager of the Activated Carbon Div., J. C. Cooper; vice president and general manager of the Protective Coatings Div., A. E. Gray; vice president and general manager of the Industrial Chemicals Div., D. J. MacLennan.

Kilsby Changes Name

Perry Kilsby Inc., Los Angeles, changed its corporate name to Kilsby-Tubesupply. R. Perry Kilsby, president, says the new name was chosen to describe the company's primary function.

U. S. Steel Builds Mill

Ground has been broken at U. S. Steel's Gary (Ind.) Works for construction of a wide plate mill (STEEL, Nov. 30, 1959, p. 65) which incorporates a combination of two rolling widths. The mill can be set up with 160 or 210 in. phase rolls by means of movable housings. The housings can be interchanged by sliding shoe plates thereby maintaining the same mill center line. The mill is designed to roll single plates weighing up to 60,000 lb. Power to the mill will be supplied by two, 6000 hp, direct drive motors.

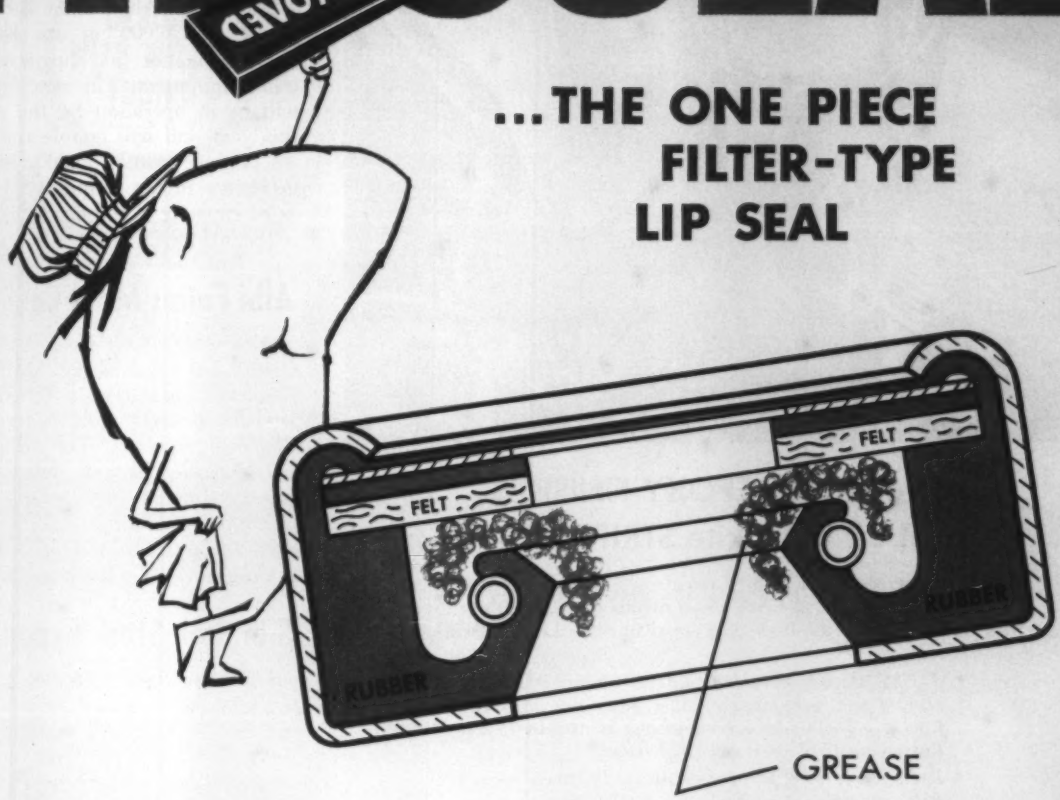
The four high, combination mill will replace a 160 in. plate mill built during World War I and is scheduled for completion early in 1962.

Research Center Enlarged

Ferro Corp., Cleveland, has launched a $255,000 expansion of its research center facilities. The

FILTOSEAL

...THE ONE PIECE FILTER-TYPE LIP SEAL



This *new* IPC lip type oil seal neatly combines the correct synthetic compound, for *your* application, with a built-in felt and rubber filter — complete with case in one compact assembly.

• • •

The bonding of felt to rubber ensures far better seal performance when abrasive particles or other foreign matter are likely to be encountered. IPC's "FILTOSEAL" protects the seal lip from being buffeted, worn or damaged.

By using a *custom* approach to case design IPC engineers can frequently eliminate the need for separate parts which add to assembly costs or maintenance problems. *More,* "FILTOSEAL" can provide adequate seal lip lubrication by incorporating a cavity for preloading lubricant.

Here is a *combination workhorse.* "FILTOSEAL" will answer more problems involving abrasive conditions than anything you've seen so far *and, do it all in one compact unit!* Let's hear about your lip type seal applications. We'll be happy to make a recommendation.

IPC

OIL SEALS / PACKINGS / PRECISION MOLDING

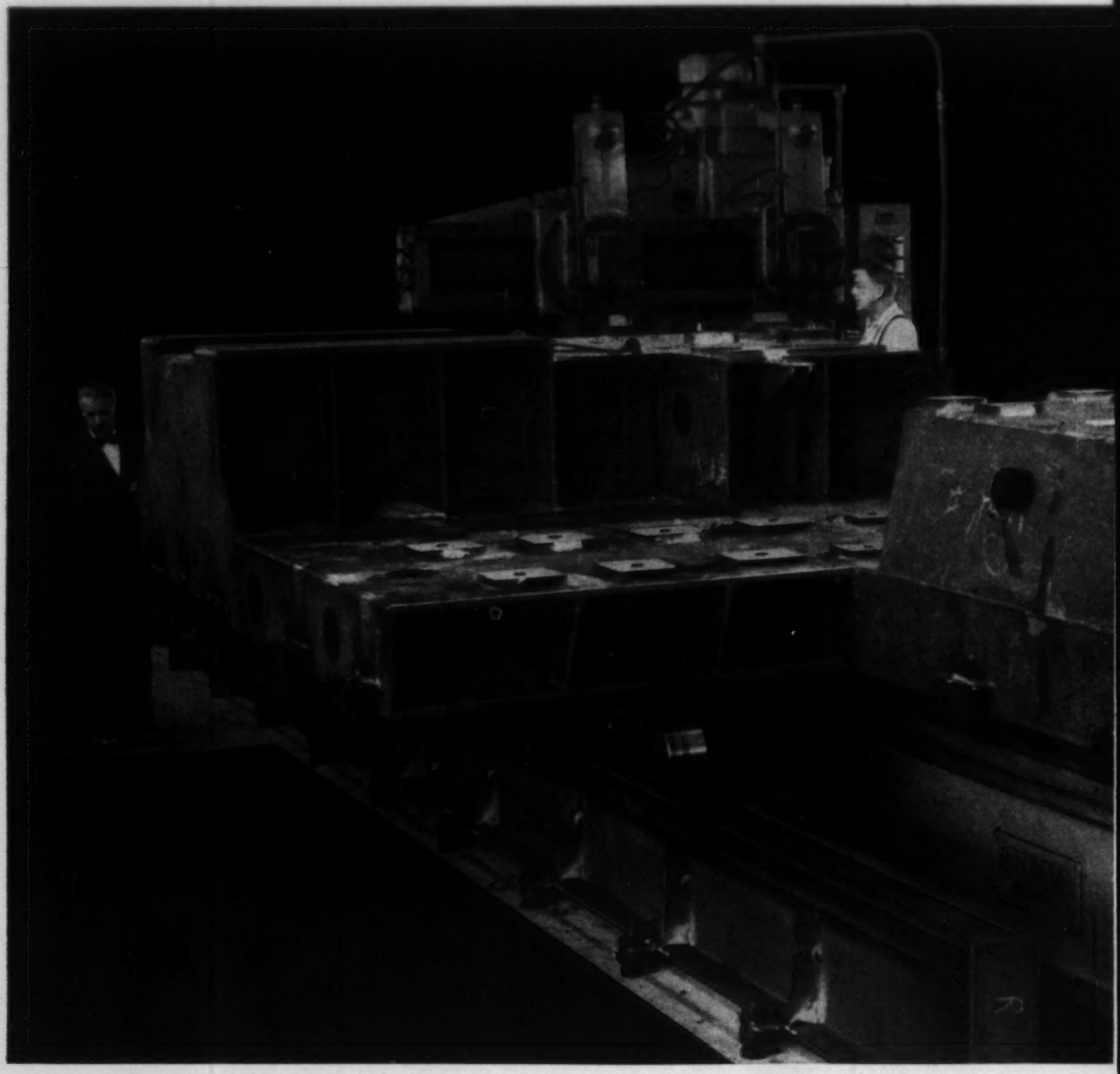
Custom designed . . . for your application.

INTERNATIONAL PACKINGS CORPORATION

Bristol, New Hampshire

P1

Nothing does the job like a..



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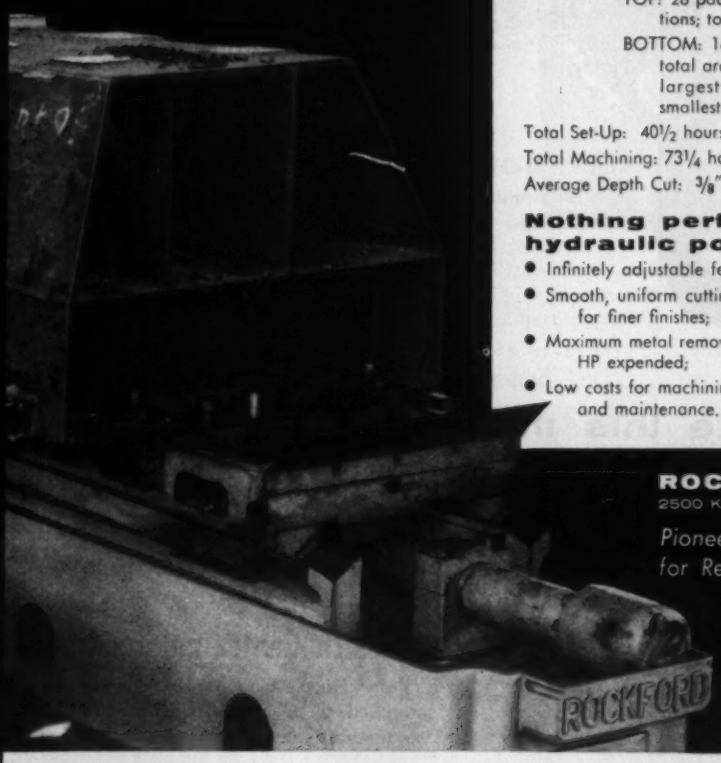

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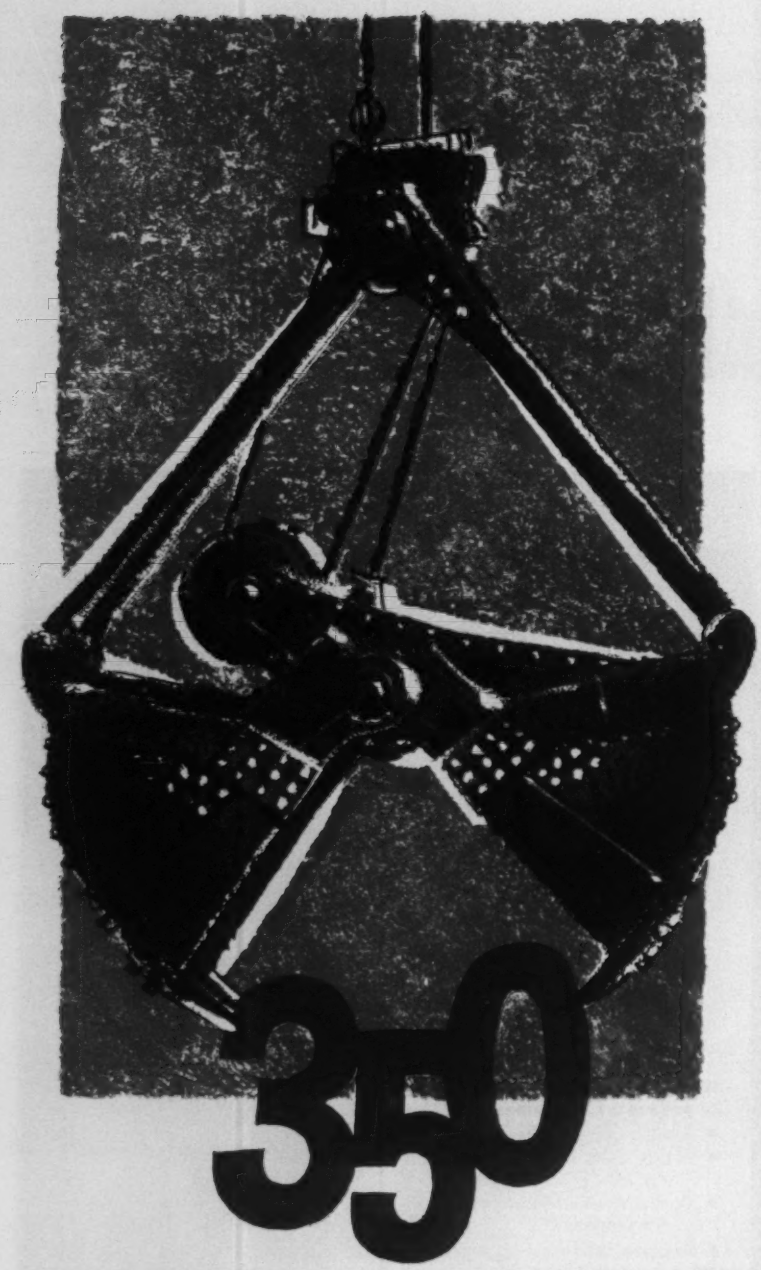

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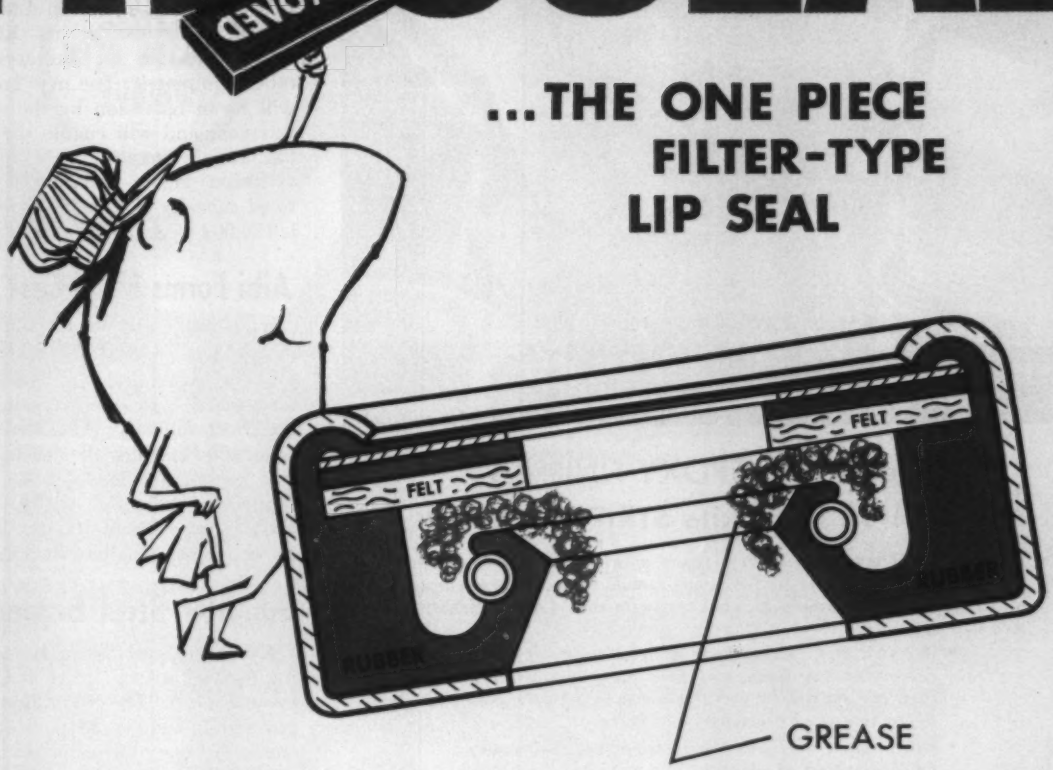

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OIL SEALS / PACKINGS / PRECISION MOLDING

Custom designed . . . for your application.

INTERNATIONAL PACKINGS CORPORATION

Bristol, New Hampshire

P1

Want to strip "unstrippable" coating?

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 SERVICE MEN • OVER 160 MATERIALS

Even tough EPOXY FINISHES peel off in Oakite STRIPPER S-A

Burn off an epoxy finish from a reject as a last resort? Not at all necessary. Oakite STRIPPER S-A strips metals clean. That's true for multiple coats as well as single coat epoxy finishes. Look at STRIPPER S-A's record:

- *A 3/16" thick coating built up from layers of epoxy coating and wrappings of fiber glass was stripped from gun barrels by overnight soak in Stripper S-A. Everything tried previously had failed.*
- *Brass plated steel parts were stripped of their epoxy finish in matter of minutes.*
- *Workholding spindles and racks laden with at least 10 coats were stripped to bare metal by a short soak. Paint hooks formerly burned clean are now soaked clean instead.*

This powerful stripper is safe for all metals except zinc and magnesium. And it's safe to the user, since it works cold . . . has no flash point . . . rinses with water.

STRIPPER S-A is but one of a long list of superior strippers by Oakite. Some are specially formulated for use on steel . . . aluminum . . . other metals. Some for removing lacquers . . . tough synthetic finishes. Still others are designed especially for removing paint from vertical surfaces. Whatever your paint-stripping problem—Oakite is bound to have the answer. Ask your local Oakite man or send for paint-stripping bulletin F-7893. Oakite Products, Inc., 34E Rector Street, New York 6, N. Y.

it PAYS to ask Oakite

OAKITE

SCIENCE

over 50 Est. 1909 years' leadership in industrial cleaning

project will provide an additional 9600 sq ft of office and laboratory space and will increase the center's research capabilities.

Alcan to Buy Equipment

Aluminum Co. of Canada Ltd., subsidiary of Aluminium Ltd., will invest $1,630,000 at its Kitimat, B. C., smelter for furnaces and other equipment. The new facilities will be in operation by the end of this year and will enable the plant to produce some 36,000 tons of extrusion ingots annually. Present rated capacity of primary aluminum is 186,000 tons.

Albi Forms Mold Cast Div.

Albi Mfg. Co. Inc., Rockville, Conn., has organized a Mold Cast Div. to specialize in chemically formulated ingot mold coatings for the steel industry. The new division will include all development and production facilities for mold coatings. Marketing will be managed exclusively by H. L. Woods & Associates, Middletown, Ohio.

Gibraltar Steel Expands

Gibraltar Steel Corp. is expanding its steel service center at Cheektowaga, N. Y. The $1 million project will include a 50 per cent increase in manufacturing area, annealing furnaces, cold rolling strip mill, and an overhead crane. The new mill will have a monthly capacity of 1000 tons. It's scheduled to be in operation by Aug. 1.

Buys Le Roi Div. Plant

Briggs & Stratton Corp., Milwaukee, producer of gasoline engines and automotive locks and switches, is acquiring the plant of the Le Roi Div., Westinghouse Air Brake Co., at 1706 S. 68th St., West Allis, Wis.

Extruder Boosts Capacity

Aluminum Extrusions Inc., Charlotte, Mich., has increased its production capacity by about 25 per cent and has enlarged its quality control department. A 40,000 sq ft plant addition has been completed. New facilities include a physical testing laboratory, a 1500 ton Loewy

WELDED STAINLESS TUBING AND PIPE in antibiotics production

DIMENSIONALLY UNIFORM for precision fabrication

SOUND, SMOOTH SURFACES—easy to clean!

Welded tubing of tough stainless steel is a designer's dream for pharmaceutical applications. Here is where elaborate networks for transfer piping call for all of welded tubing's advantages . . . *predetermined* uniformity of wall thickness . . . consistent roundness . . . smooth, readily cleaned surfaces, inside and out.

These inherent qualities confer ease and speed in complex fabrication. Welded steel tubing is adaptable to all types of fittings. Every type of joint can be produced. Forming is precise because welded tubing is dependably accurate in dimension in every size, length after length.

Complete design data is available to you from FSTI headquarters. Ask for comprehensive Bulletin 8591 . . . and for assured application satisfaction, specify welded tubing from a quality tube producer.

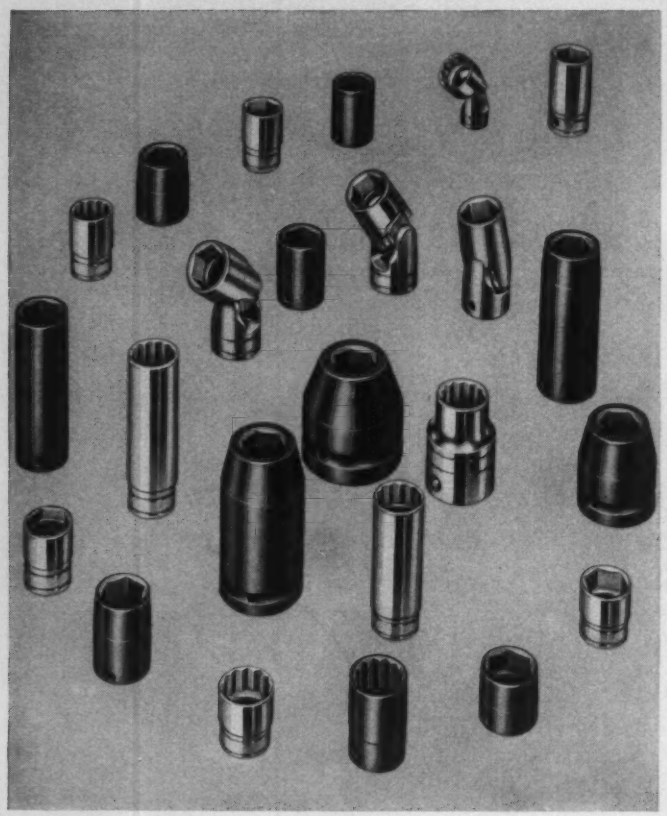
FORMED STEEL TUBE INSTITUTE, INC.

1604 Hanna Building, Cleveland 15, Ohio

• Armco Steel Corp. • The Babcock & Wilcox Co., Tubular Products Div. • The Carpenter Steel Co., Alloy Tube Div. • Clayton Mark & Co. • Damascus Tube Co. • Jones & Laughlin Steel Corp., Electricweld Tube Div. • National Tube Div., United States Steel Corp. • Ohio Seamless Tube Div. of Copperweld Steel Co. • Republic Steel Corp., Steel and Tubes Div. • Revere Copper and Brass Inc., Rome Manufacturing Company Div. • Sawhill Tubular Products, Inc. • Southeastern Metals Co. • The Standard Tube Co. • Superior Tube Co. • Trent Tube Co., Subs. Crucible Steel Co. of America • Union Steel Corp. • Van Huffel Tube Corp. • Wall Tube & Metal Products Co.

LC-602

what? all these Snap-on sockets to drive just one size nut?



yes — AND HERE'S WHY: Every ¾-inch socket shown here solves a particular industrial nut-running problem. *Snap-on* makes this variety of ¾-inch hex wrench sockets and many more sizes and styles to give you just the one you need to match the job you have to do. Standard length, bolt clearance length, magnetic, Flexockets, power, power-impact and thin-wall types let you choose the socket to do your job faster and more efficiently, with less breakage.

ASK YOUR Snap-on MAN — If you have a production or maintenance problem involving special socket design or application, or any other question on tools, talk it over with your *Snap-on* man. He is a specialist who devotes all his time to industrial application of *Snap-on* tools. Write us or call your nearest *Snap-on* branch. Free catalog of industrial wrenches and hand tools is yours for the asking.

FOR ALL INDUSTRY

SNAP-ON TOOLS

8121-D 28th AVENUE • KENOSHA, WISCONSIN

Hydropress, a plant-wide conveyor system, a pilot color anodizing line, and a photo comparator to check configuration and dimensions of dies.

NEW ADDRESSES

Hooker Chemical Corp. moved its corporate headquarters from Niagara Falls to 666 Fifth Ave., New York, N. Y. The New York District sales offices and export sales department will also function from this address.

Versa Products Co. Inc., moved its plant from 249 Scholes St., Brooklyn, N. Y., to 150 Coolidge Ave., Englewood, N. J. The company makes pneumatic and hydraulic valves.

Electri-Flex Co. completed its move into a new plant at 60 W. Central, Roselle, Ill. The plant turns out flexible electrical conduit.

Z. H. Mfg. Co., a division of General Castings Corp., moved to larger quarters at 1000 N. Division St., Peekskill, N. Y. The move boosts casting capacity by 200 per cent. Facilities include secondary machining operations, heat treating, and liquid honing.

CONSOLIDATIONS

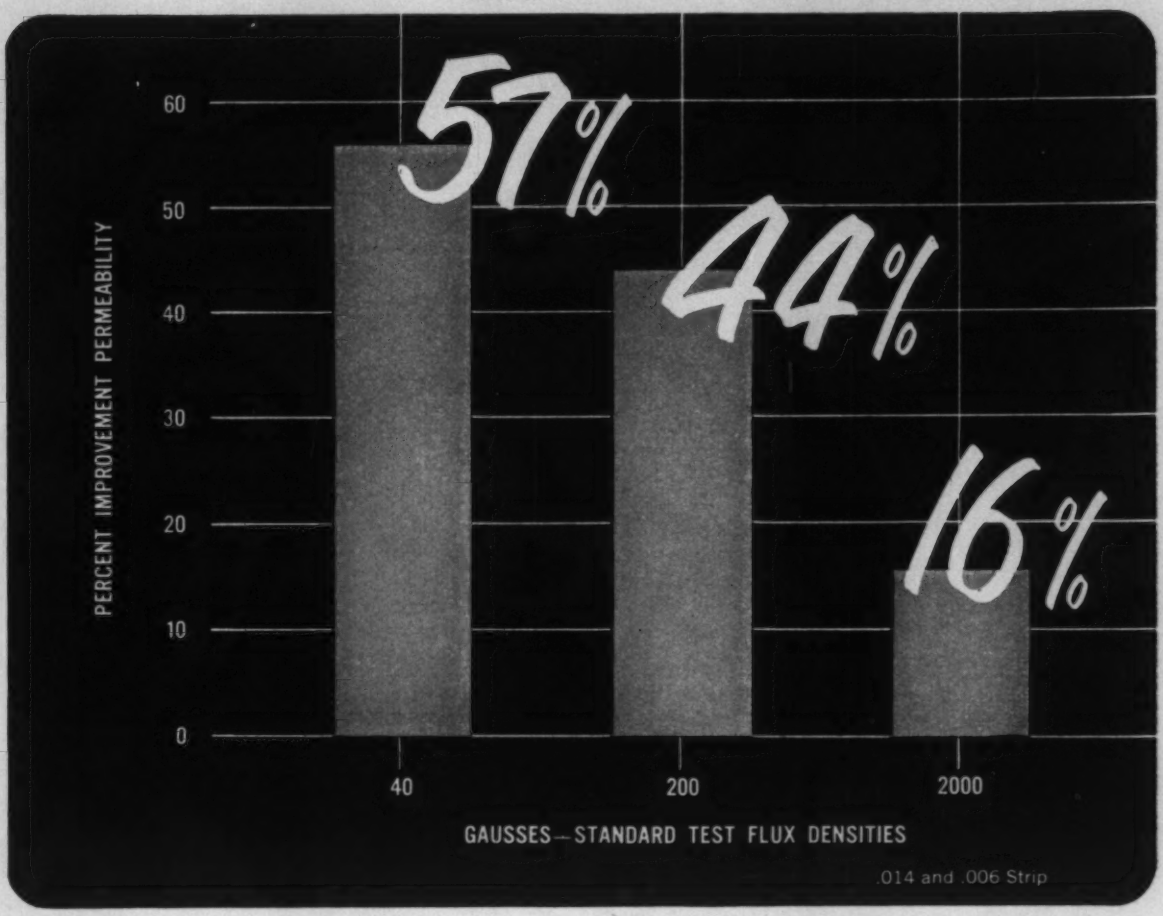
Duraloy Co., Scottdale, Pa., acquired **Walmil Co.**, Pleasant Ridge, Mich., manufacturer of high alloy fixtures, such as corrugated boxes, heat treating fixtures, and dipping baskets. The firm will become Duraloy's Walmil Div. Former officers of Walmil will continue in their respective capacities in the new arrangement.

Unit Crane & Shovel Corp., Milwaukee, purchased **Bay City Shovel Inc.**, Bay City, Mich. Both firms manufacture cranes, shovels, backhoes, and drag lines. The plant will function as a wholly owned subsidiary.

Van Huffel Products Inc., Warren, Ohio, purchased the product

(*Please turn to Page* 132)

Experience**—the added alloy in **A-L Electrical Steels



Greater permeability for Allegheny Ludlum's AL-4750...and it's *guaranteed*

promises more consistency, higher predictability for magnetic cores

AL-4750 nickel-iron strip now has higher *guaranteed* permeability values than ever before. For example, at 40 induction gausses AL-4750 now has 57% higher permeability than in the past, using the standard flux density test.

This greater permeability means better consistency and predictability for magnetic core users . . . and allows careful, high performance design.

This improvement in AL-4750 is the result of Allegheny Ludlum's continuing research on electrical alloys and nickel-bearing steels. Moly Permalloy has been similarly improved in permeability. A-L constantly researches silicon steels, including A-L's well-known grain-oriented silicon, Silectron, and other magnetic alloys.

Complete facilities for the fabrication and heat treatment of laminations are available at Allegheny Ludlum. And A-L's technical know-how guarantees you close gage tolerance, uniformity of gage throughout the coil and minimum spread of gage across the coil-width.

If you have a problem on electrical steels, laminations or magnetic material, call A-L for prompt technical assistance. Write for blue sheet EM-16 for complete data on AL-4750. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa. Address Dept. S-4.***

7491

ALLEGHENY LUDLUM

STEELMAKERS TO THE ELECTRICAL INDUSTRY

Export distribution, Electrical Materials: AIRCO INTERNATIONAL INC., NYC 17
Export distribution, Laminations: AD. AURIEMA, NYC 4

Traveling stacker at shipping terminal stockpiles up to 100,000 tons of crushed gypsum received by rail from mines. Reclaiming conveyors under each pile and traveling gantry load ships at 750 tons per hour.

WHY MATERIALS ON BARBER-GREENE

You get most efficient design, lower cost components and fastest delivery on Barber-Greene standard or specially engineered systems

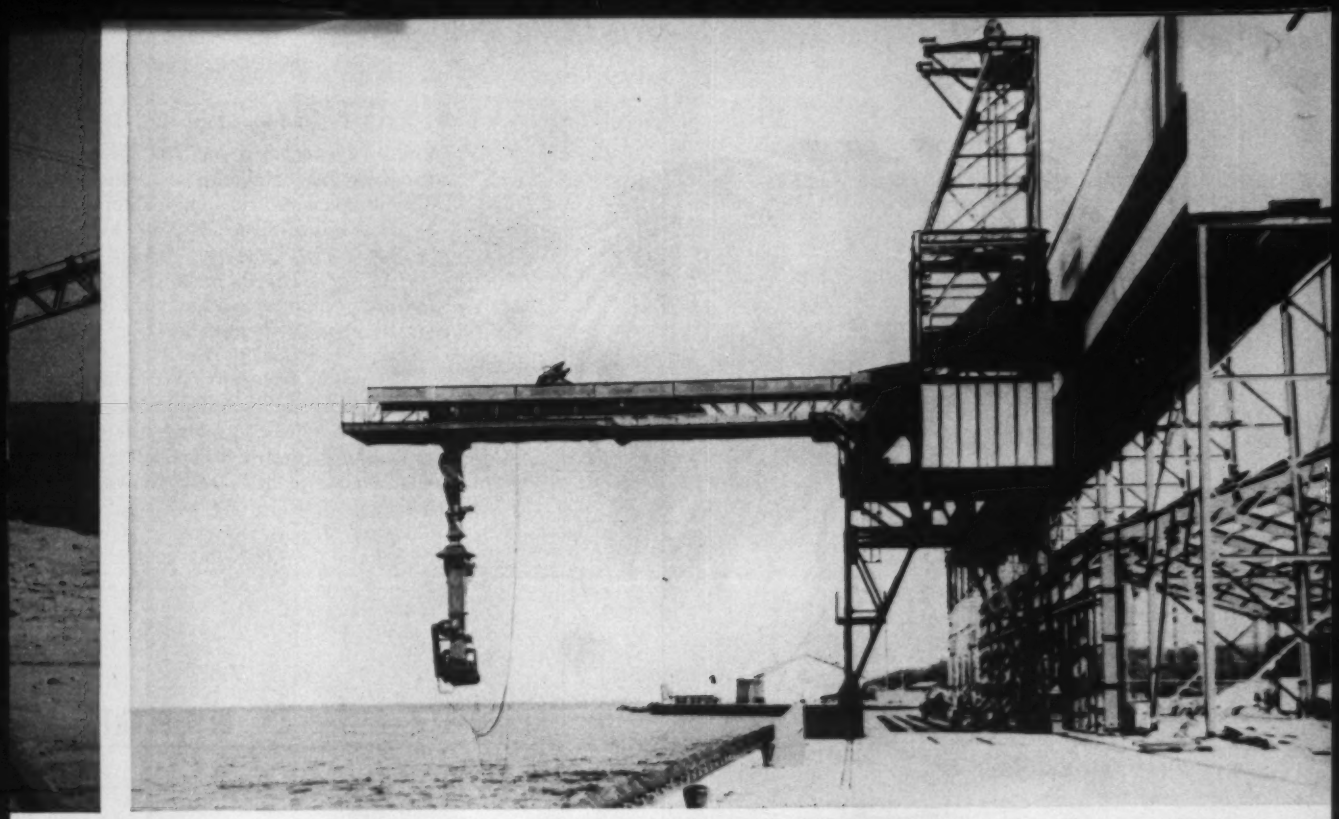
Here are reasons your materials ride for less when Barber-Greene solves any bulk material handling problem:

MOST EFFICIENT DESIGN—Barber-Greene design engineers, backed by more than 40 years of conveying experience, design for you the most efficient, most economical conveyor system available.

LOWER COST COMPONENTS—Your design savings are compounded by your savings on standardized conveyor components. Barber-Greene, pioneer and largest producer of these higher quality components, passes on to you, volume-production savings no other manufacturer can equal. That means that when your conveyor can be entirely built from standardized components, and most can, your savings are king-sized. Even if yours is a very special type of application, you still save because of Barber-Greene's vast experience in designing and building specially engineered conveyor systems.

NO TIME LAG—Barber-Greene standardized components take the urgency out of your conveyor emergency three ways: 1) faster quotation; 2) faster delivery; and 3) faster erection.

You can find out how much you'll save merely by calling your nearby Barber-Greene Conveyor Representative. He will quickly quote you money-saving prices on either your entire system or on whatever conveyor equipment you need. Call today.

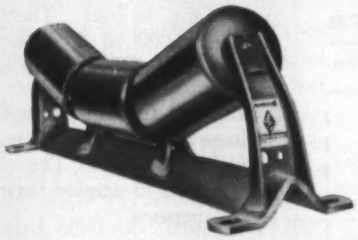


Complete specially engineered conveyor system at Kawaihae Terminals, Inc., Island of Hawaii, stockpiles raw suger received from trucks. Reclaiming conveyors and traveling gantry load ships at 600 tons per hour.

RIDE FOR LESS
BELT CONVEYORS

YOU SAVE ON ANY SIZE JOB

You can benefit from these savings whether your conveyor is fabricated from channel frame or giant gallery truss, whether capacities handled are a few hundred or thousands of tons hourly, or whether belt widths are 18 or 60 inches.



Two new series of heavy duty belt conveyor idlers have revolutionary design improvements that assure longer life. Write for new bulletin.

Your belt conveyor equipment headquarters

Representatives in Principal Cities of the World

Barber-Greene BG

Main Office and Plant AURORA, ILLINOIS, U. S. A.
Plants in DeKalb, Illinois..Detroit..Canada..England..Brazil..Australia

CONVEYORS • LOADERS • DITCHERS • ASPHALT PAVING EQUIPMENT

Are Small Precision Metal Parts Getting In Your Hair?

If you need precision in small metal parts you can get it from Torrington – plus exactly the right finish, temper and hardness required for your needs. Moreover, Torrington can produce such parts at high speed and a remarkably economical cost. We are the leading specialist in this field – with the specialized skills, engineering experience and facilities to save you money. If you have small parts to be manufactured in large quantities why not let Torrington solve your entire problem. Use the coupon below to get prompt action.

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Name_____ Title_____

Company_____

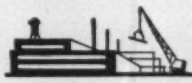
Address_____

City_____ Zone_____ State_____

(*Concluded from Page* 128)

lines of **Power-Strut Inc.** and **Decor Products Inc.**, Framingham, Mass. The products will be manufactured by the Power-Strut Div. of Van Huffel. The products include a system of surface raceways and lighting supports for the electrical and mechanical fields.

Thompson Ramo Wooldridge Inc., Cleveland, concluded an agreement to acquire controlling interest in **Good-All Electric Mfg. Co.**, Ogallala, Nebr. TRW will exchange common stock for 80 per cent of Good-All stock. The firm produces capacitors for industrial and military use and for home television and radio receivers.



NEW PLANTS

American Alloys Inc., a new company, has opened a plant in Newark (San Francisco), Calif., to manufacture alloy welding wire.

Robertshaw-Fulton Controls Co., Richmond, Va., is completing a $4 million plant at New Stanton, Pa., for its Robertshaw Thermostat Div. The facility contains 361,000 sq ft of manufacturing, office, and engineering space. Once in operation, plants at Youngwood and Scottdale, Pa., will be sold.

Thermomet, engaged in the research, development, and production of metal and alloy protective coatings, opened a plant at 1817 First St., San Fernando, Calif.

Samuel Son & Co. Ltd., Canadian steel distributor, will open a $2 million plant on Dixie Road, Toronto, Ont., in June. The unit will supply 95,000 sq ft of warehouse space and 12,500 sq ft for offices.

Standard Coil Products Co. Inc., Melrose Park, Ill., is locating a plant in Oshkosh, Wis. The electronic firm expects to employ between 500 to 600 persons.

Griffin Wheel Co., Chicago, is producing cast iron pressure pipe from its converted plant at Council Bluffs, Iowa. The 95,000 sq ft of space was formerly used to produce iron wheels.

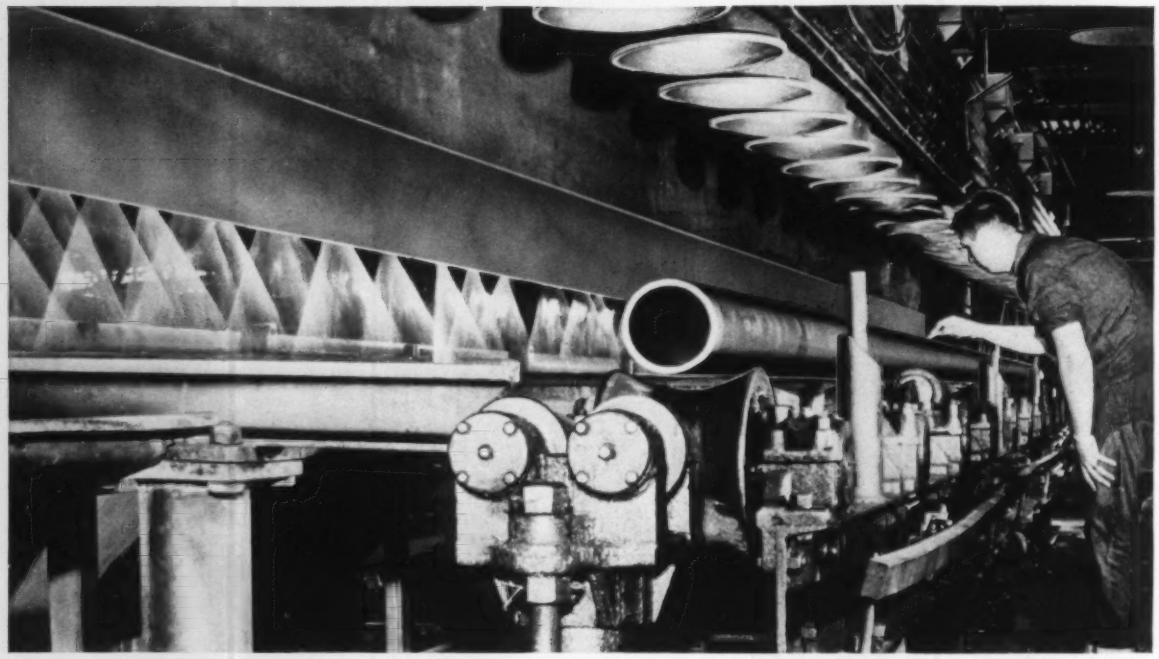
No. 2 Cold Rolled Shearing Line, Cleveland Works, Jones & Laughlin Steel Corporation

Wean, J & L and Shearing . . .

This precision-engineered line was designed by Wean for shearing cold rolled steel strip at the Cleveland Works of Jones & Laughlin Steel Corporation. This cold rolled shearing line handles 60,000 pound coils in strip widths up to 48″ and gauges from .025″ to .060″, producing leveled, oiled sheet from 30″ to 180″ in length. Speeds up to 800 fpm are possible through the use of improved design lapping conveyors on both prime and reject pilers.

Wean is the world's most experienced builder of steel strip processing lines. Our reserve of engineering know-how is always available to assist you in your expansion planning. To meet your customers' most exacting requirements, why not let Wean's *creative engineering* work for *you.*

THE WEAN ENGINEERING COMPANY, INC. · WARREN · OHIO



Automatic high speed Magnaglo Test System detects surface cracks in large tubing and pipe. Tube is supported over a roll conveyor by jacks which turn it for inspection on all sides. Cracks are marked with crayon for subsequent removal by grinding. Spray nozzles (left) bathe tube with Magnaglo fluorescent particle suspension before tube rolls into the inspection booth. Black light is supplied by a bank of 34 high intensity lamps.

automatic high speed testing

finds 1/10,000" cracks in 48′ steel pipe

This pipe is critical. It goes into oil wells where, thousands of feet below the surface, a failure is not only expensive, but can cause the loss of much production from an entire oil field. So, even the smallest cracks must be found—and inspection must be fast.

Magnaflux devised the test system that includes fully automatic handling and testing of seamless tube up to 48′ long and $10\frac{3}{4}$″ in diameter. The big pipe is conveyed and passes in continuous flow through the Magnaflux-Magnaglo inspection unit. Magnetized under 6000 amperes, full wave DC, it passes under a double row of spray nozzles that bathe the pipe with specially developed fluorescent Magnaglo particles. Moving on, it is raised by jacks and rotated to permit inspection under black lights. Even the smallest crack is impossible to miss with Magnaglo. Only a single inspector is required.

Pipe with defects is tipped off the conveyor for corrective surface grinding on an adjacent grinding table, and retesting. No pipe with significant defects ever gets to a customer!

This high-speed automatic unit is just one example of Magnaflux' ability to supply test systems to meet virtually any testing need. These can be automatic, conveyorized inspection or individual parts inspection, for ferrous or nonferrous materials.

There is—or can be developed—a Magnaflux Test System to meet your test needs exactly, for a few parts or a few million—from billets to bolts. The Magnaflux Field Engineer, backed by the total experience of Magnaflux—"The House of Answers in Nondestructive Testing"—is ready now—to help you get *more* profitable production to *any* quality level *your* use determines.

Ask for a meeting soon. Write us—Magnaflux Corporation, 7312 W. Lawrence Ave., Chicago 31, Illinois.

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The Hallmark of Quality in nondestructive test systems

Magnaflux Test Systems

MAGNAFLUX-MAGNAGLO to test magnetic materials for cracks, seams, etc.
ZYGLO for nonmagnetic and other materials; cracks, leaks, etc.
SONIZON Ultrasonic Thickness Measuring
STRESSCOAT to find and measure stress on parts, overall!
MAGNATEST electronic testing for hardness, conductivity, alloy, proximity, and many more. Also for precision magnetic field measurement.
And still other methods and techniques, some completely new.

PUSH BEARING FRONTIERS— "Invisible" dirt particles in ultraprecise bearings can be revealed by polarized light, reports Alloyd Corp., Cambridge, Mass. Such particles can't be moved by ordinary cleaning methods. Best answer: A 1 per cent solution of nitric acid in alcohol which not only loosens and removes such particles but leaves ball and race surface far smoother than any previously known method. Solution is swabbed on the bearing.

IMPROVES ATMOSPHERE CONTROL— A new endothermic atmosphere generator produces 3000 cu ft of atmosphere per hour at a minus dew point. Purpose: To handle the new binders being used with latest sintering compacts. The equipment, designed by C. I. Hayes Inc., Providence, R. I., uses 1950° F with excellent control, producing good cracking without propane additions, combinations which are said to be extremely hard to achieve.

HUGE LITTLE MEMORY— Radio Corp. of America has unveiled an ultracompact magnetic memory. It can pack 2048 bits of information into 1 cu in. It consists of eight stacked ferrite aperture plates providing the prefabricated equivalent of 2048 individual prewired cores—each plate occupies only 0.8 in. square.

OUTSIZE BEARINGS— Latest proposals for ball bearings: Races 30 ft in diameter; balls are 8 in. They'll be used in radar units now being constructed.

CARBON OVERCOAT— Coating carbon directly onto steel is expected to greatly improve its performance in electron tubes, says Texas Instruments Inc., Attleboro, Mass. The material was displayed at last week's Institute of Radio Engineers show in New York.

ELECTRON MACHINING NOTE— Latest techniques using electron beams are said to produce 0.00075 in. holes in stainless 0.040 in. thick. The method also drills holes in magnetized metals without affecting the magnetic properties of the workpiece. W. Opitz, Carl Zeiss Corp., Germany, revealed at a Boston symposium that his firm has just about perfected a magnetic tape programer for use in electron beam milling complex outlines in practically any material.

UNDERWATER TV— In building a Polaris missile launching base, a contractor used an underwater TV camera to supervise, from a barge, the construction and inspection of placing concrete 100 ft below the surface of the Pacific Ocean, reports L. C. Rogers, president, Bates & Rogers Construction Corp., Chicago.

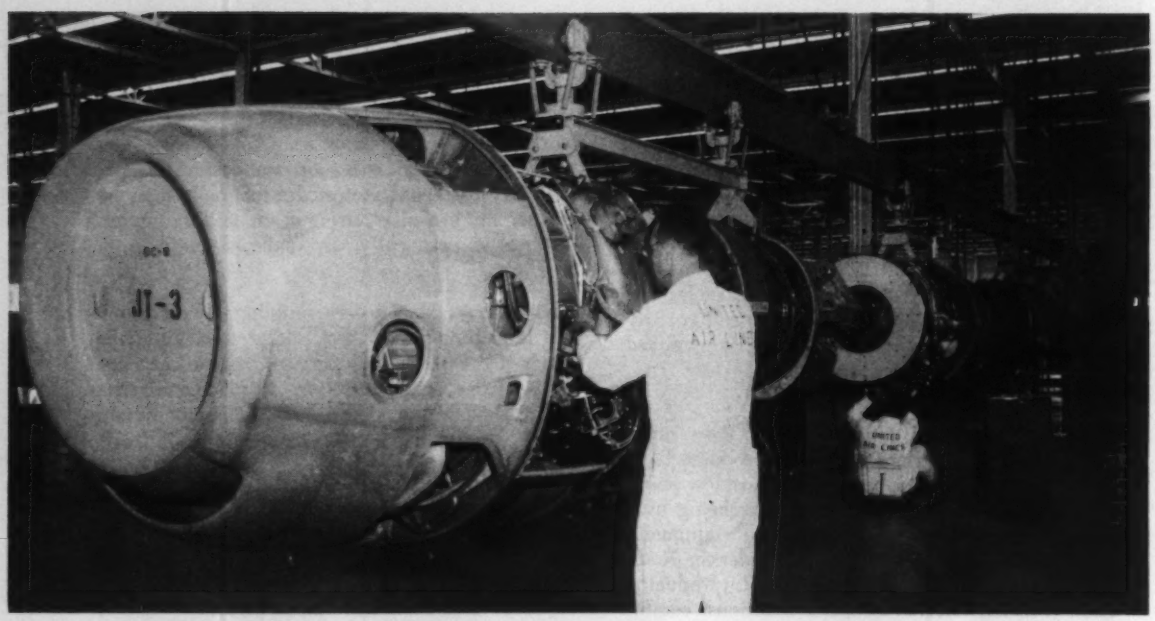
GETS ULTRALOW SUCTION— By wedding good vacum techniques to conventional equipment, Kinney Mfg. Div., New York Air Brake Co., Boston, has been able to achieve pressures approaching 0.000001 micron. "For all practical purposes, a vessel at that pressure is absolutely empty," states William Crowley, director of engineering.

CERAMIC WORK— Electric Autolite Co. and Allis-Chalmers Mfg. Co.'s Nuclear Power Dept. have joined forces to develop and demonstrate an extrusion process for fabrication of ceramic fuel bodies—under an Atomic Energy Commission contract. The bodies are intended for use in nuclear plants.

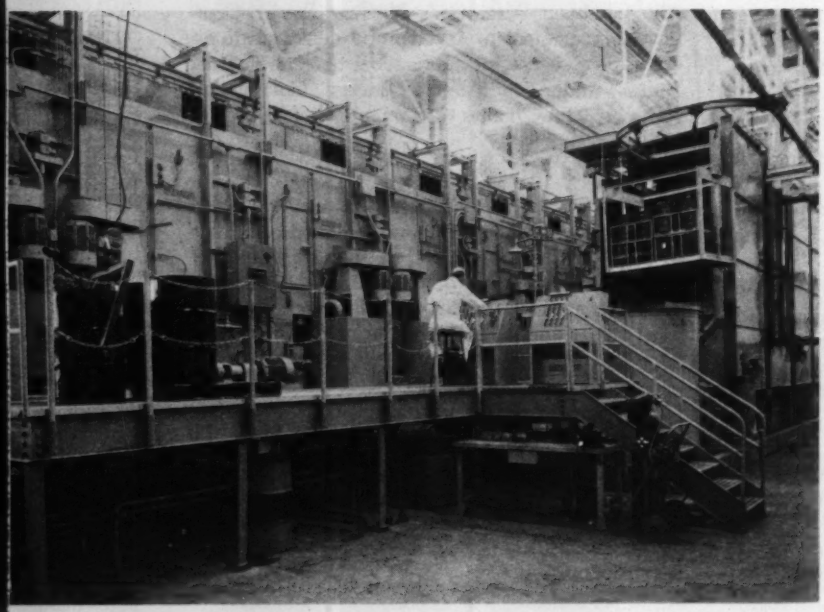
ACCURATE HEAT STANDARD— When used as a reference standard, a new, insulated cell holds to 0.01° centigrade (0.338° F) with variations of less than five-one hundred thousandths of a degree, claims Trans-sonics Inc., Burlington, Mass. That spells improvement in the precision of temperature measurements, says the company.

GROUND LEVEL SPACE STATIONS— Metalworking in evacuated (vacuum) factories is in the planning stage. Reason: To solve some of the contamination problems encountered in handling today's highly reactive metals. At least one West Coast firm is said to be proceeding with construction.

The Metalworking Look, Tailored



A J-57 engine is readied for reinstallation in a DC-8 jet passenger plane. During reassembly, engines ride on monorail that can support 5 tons

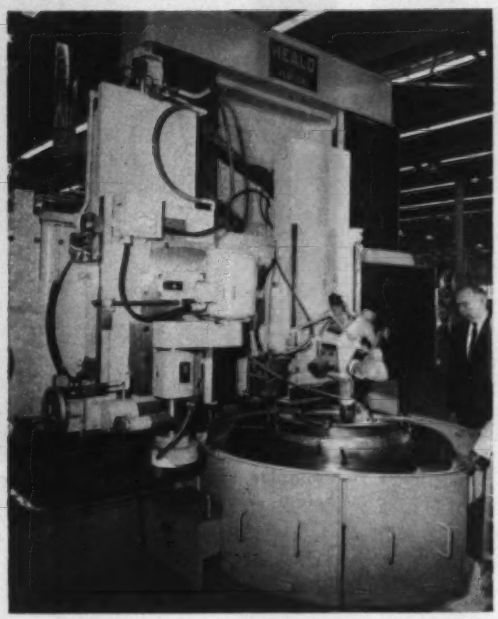


Stacked in metal baskets, parts ride a monorail through this cleaning machine built for United by Ransohoff Co., Hamilton, Ohio. The cleaning cycle is controlled from the console at center

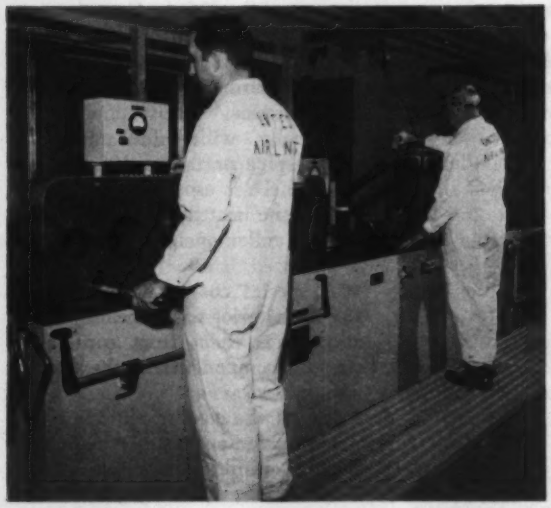
Pumps, valves, regulators, and other components of a jet engine water injection system are tested on this stand made by the G. L. Nonkervis Co., Detroit

for an Airline

United Air Lines sets up a jet engine maintenance base that works like an in-line production plant. At peak capacity, expected in 1963, it will turn out five overhauled jet engines each 16 hour day



United maintenance men use this $100,000 vertical machine to grind, bore, face, and turn a variety of jet engine parts. The Heald machine will take parts up to 52 in. in diameter and 48 in. high



In nondestructive testing department, Mechanic A. W. Robinson (left) operates an induced current Magnaflux installation, while Inspector Walter Frye magnetizes a center bearing support. Magnetized parts are then inspected under black light for possible structural defects

UNITED AIR LINES'S new, multimillion dollar engine overhaul facility near San Francisco's International Airport is laid out like an auto production plant. The 300 by 400 ft building is loaded with metalworking production and inspection equipment.

United will use it to overhaul and rebuild turbine engines for the company's jet fleet. United has committed $383 million for 40 DC-8s, 18 Boeing 720s, and 20 French-built Caravelles.

J. A. Herlihy, United's senior vice president-engineering and maintenance, says a peak of five engines a day will be reached in 1963. In the interim, the facilities will be made available to other airlines on a contract basis.

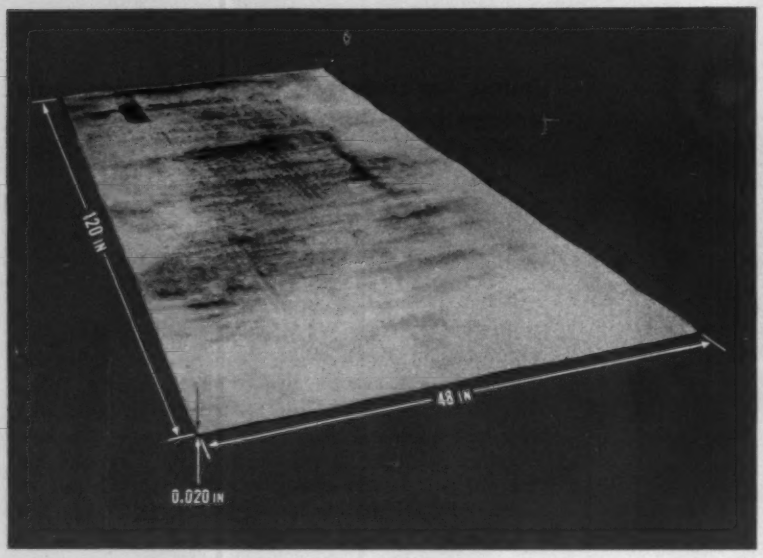
• **Layout** — The shop consists of four major work areas: Disassembly, cleaning and inspection, assembly, and accessory overhaul. An intricate network of overhead monorails, hoists and cranes, designed and installed by the Twin City Monorail Co., Minneapolis, facilitates movement of engines and heavy components between work areas. Each monorail can support 5 tons—a conveyor system is used for transporting lighter parts.

One of the specialized machines, a Model 578 vertical made by Heald Machine Co., Worcester, Mass., is used to grind tips of rotor blades, turn inside diameters and shoulders of aluminum rings, turn and grind stainless steel diffuser case joints, grind bearing seats, and do a host of toolroom jobs. The machine has both a grinding head and a metalcutting turret that can hold five single point tools. Raymond A. St. John, Heald's vice president, says: "In its class, it is the most completely universal machine tool ever build by Heald."

• **Schedule**—United overhauls its jet engines after every 800 hours of flying time. The interval will be extended from time to time in keeping with the performance of the engines. On the basis of a seven month period, W. C. Mentzer, United vice president-engineering, recently said that jet engines are vastly superior to piston engines. The engines of the DC-8 accumulated 34,700 hours (equivalent to 18 million miles) without a single failure of basic components.

More than 240 mechanics, production control personnel, and engineers are employed in the new facility. They're under the direction of Manager Sumner P. Youngblutt.

Flatter Sheets Increase



Protective coating, sprayed on sheets before they enter heat treating fur-

Titanium's Usefulness

They will make it possible for users to take greater advantage of the metal's strength-to-weight ratio, says Republic Steel Corp. Sizes range up to 48 by 120 in. Tensiles exceed 190,000 psi, which will interest aircraft designers

USERS of titanium can now buy large, ultraflat, light gage sheets that will enable them to take greater advantage of the metal's strength-to-weight ratio, announces Republic Steel Corp., Cleveland.

The completely heat treated alloy sheets are expected to solve problems in the production of aircraft and missiles and also broaden the application potential of the material, says the corporation's Central Alloy District, Canton, Ohio.

Anticipated applications include: Aircraft and missile skins, stiffeners, internal structures, engine nacelles, bulkheads, heat shields, and cover sheets for honeycomb structures.

• As the sheets are rolled thinner (to save weight) the problems of maintaining flatness tolerances increase.

Any heat treater will tell you that quenching thin sheets in a heat treatment process usually results in warpage. In Republic's process, the sheets leave the furnace and pass to a roller quench unit to give good flatness initially; aging the quenched sheets between heated platens levels them more.

The product was primarily developed for the RS-140 grade (5.0 Al, 1.25 Fe, 2.75 Cr), but other alloys, such as RS-120A and RS-115, have been treated. And the alloys will continue to be sold in the annealed condition for those users who do their own heat treating; in other shapes, there may be little advantage in pretreated stock. The high hardness of the heat treated material could also preclude its use where severe forming must be employed.

• The heat treated material offers tensile strengths in excess of 190,000 psi; sheets down to 0.010 in. thick in sizes up to 48 in. by 120 in. can be supplied.

E. R. Johnson, Republic's vice president in charge of operations, feels that the new product offers aircraft designers a material with a strength-to-weight ratio greater than any other material currently being used in aircraft production.

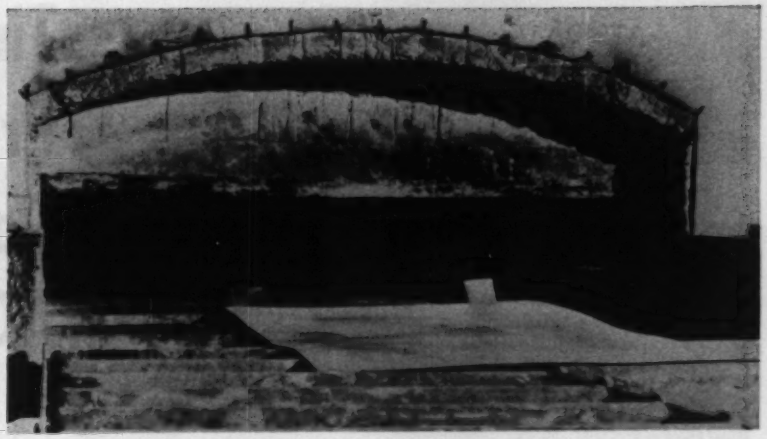
Commercial production of the sheets at Republic's Canton plant requires close control of the heat treating cycle. Heating for the solution treatment employs a five-zone furnace. Each zone, heated electrically, will hold temperature within plus or minus 10° F. And the furnace is especially adapted to deliver the heated sheets into a continuous roller quenching unit.

• A special coating is sprayed on the sheets prior to the heating cycle. It protects them from contamination by components of the furnace atmosphere.

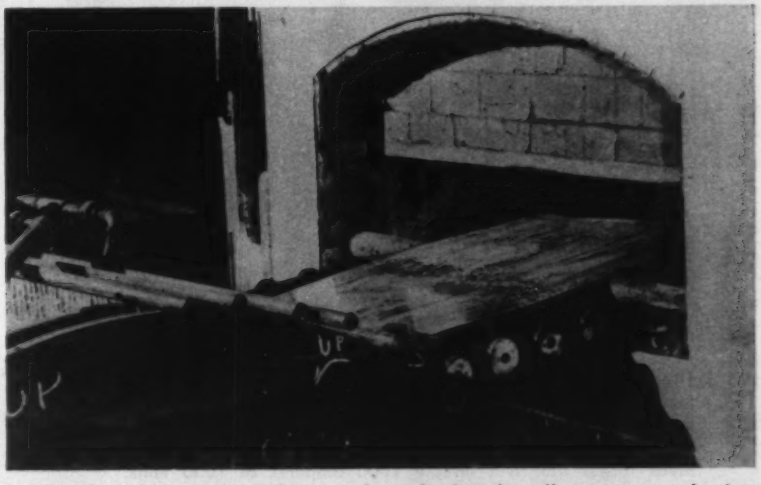
Use of the coating eliminates the necessity for a caustic type molten salt for cleaning the sheets.

The roller quenching unit uses water sprays for rapid cooling; the as-quenched sheets have good flatness. In making measurements, a straightedge is placed on the sheet, and the depth of a valley, divided

nace, prevents contamination by elements in the furnace atmosphere



Precoated sheets enter the continuous electric roller hearth furnace for solution heat treatment. Five zones provide temperature control



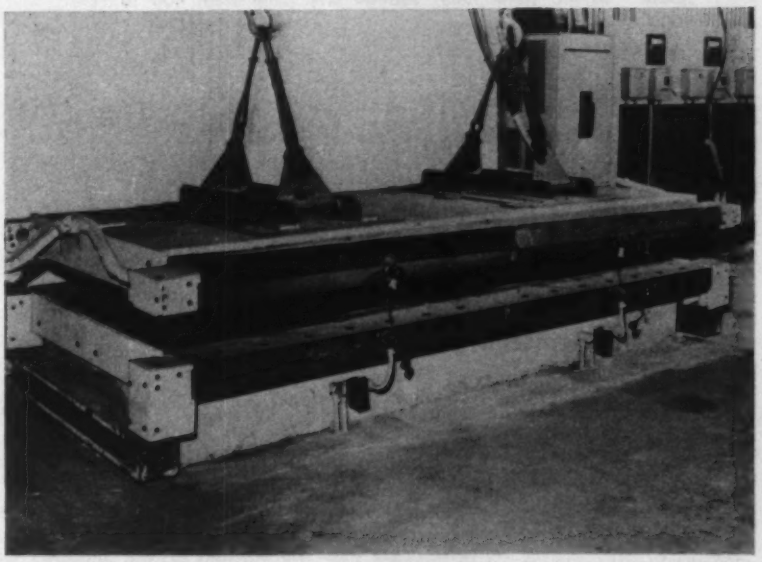
Leaving the solution treating furnace, sheets feed to the roller spray quench. Jets of water provide cooling

by the distance between the hills, is expressed as a percentage. The quenched sheets have been produced with a flatness of 2.5 per cent; with previous methods, the figure was 8 to 10 per cent, Republic says.

Quenching completes the solution treatment. Quenched sheets are soft and can be cold or hot formed in this condition. Aging for several hours—usually between 900 and 1000° F—develops the high strength properties.

For further flattening, aging is carried out at the mill between heated platens. It reduces initial low distortion, produces flatter sheets of the required high tensile values.

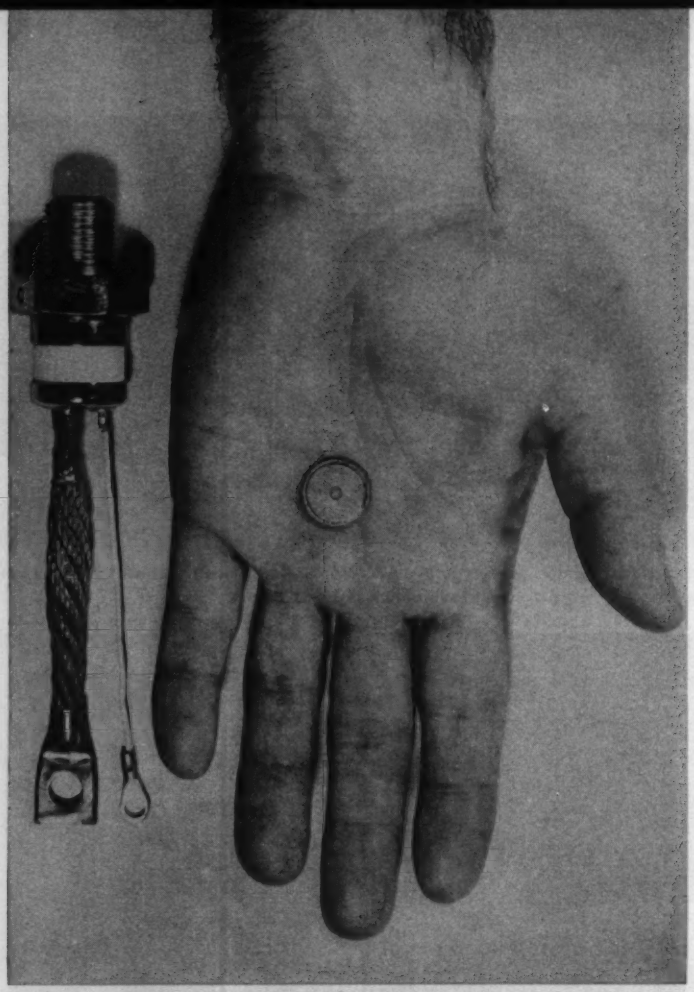
Physical properties of the RS-140 sheets can be modified in the heat treating process. Higher aging temperatures can increase ductility, with somewhat lower tensile strength; the temperature used for solution treatment will also help determine the physical properties.



Aging between platens, heated electrically, develops the hardness of the sheet. Process further flattens it

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. Usership of this article could bring you $1000. See Page 5 in this issue.

Tiny Work Horses Promise Cheaper Conversion of AC to DC



The tiny silicon wafer in the man's hand is the basic functional element of the Trinistor switch alongside. The wafer, smaller and thinner than a dime, can control 100 amperes at 200 volts. Westinghouse predicts development of a wafer not much larger that will handle 1000 amperes at 1000 volts. Current density now is 500 amperes per square inch; by 1965, it'll reach 1000 amperes per square inch, says Westinghouse. In the same time, voltage will jump from 400 to 1000 or more

Westinghouse predicts that the capital cost per kilowatt of Trinistor static inverter will fall below that of conventional rotating systems by 1965 or '66 and will compare with the ignitron system between 1966 and 1972

YOU MAY SOON have a cheaper way to convert direct current into alternating current.

It's promised by the development of semiconductor power inverters. The small, lightweight units offer high reliability, little maintenance, a minimum of noise, and high efficiency. They can be produced in a wide range of geometric forms. And the capital cost will eventually be lower than that of more conventional inverters, says Westinghouse Electric Corp., which is developing such units.

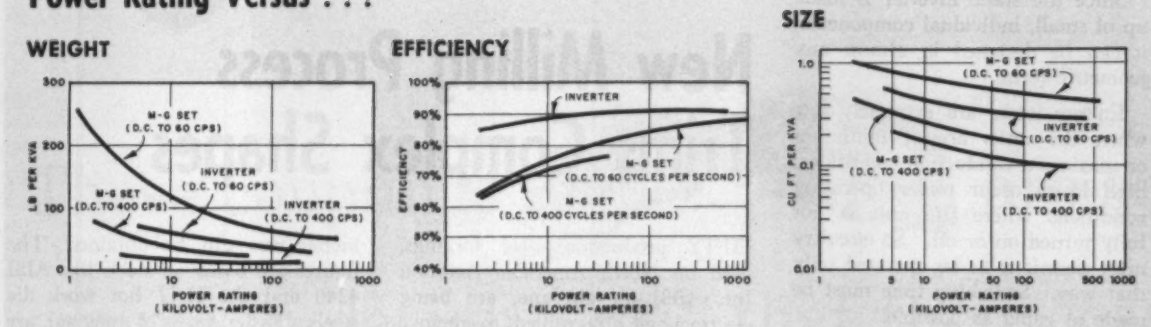
• **How It Works**—The inverters are constructed of pairs of transistors or Trinistors. Above the 10 kilowatt level, the Trinistor appears to be more suitable, Westinghouse believes. A Trinistor rectifier contains a silicon wafer arranged so that a control element can cause the device to go from high impedance to low impedance. Its electrical characteristics are similar to those of a thyratron or ignitron.

An inverter requires at least one pair of Trinistors—one of them supplies the positive half cycle of the alternating current wave; the other supplies the negative half cycle. Westinghouse has already built inverters that operate to about 60 kw of power with frequencies as high as 20 kilocycles per second.

• **Where It's Used**—The device is not yet economically competitive with conventional units in high power applications—although the cost dropped 75 per cent last year and "rapid reduction is expected to continue," E. J. Duckett, Westinghouse section manager, reports.

But for many lower power applications, the inverter is already

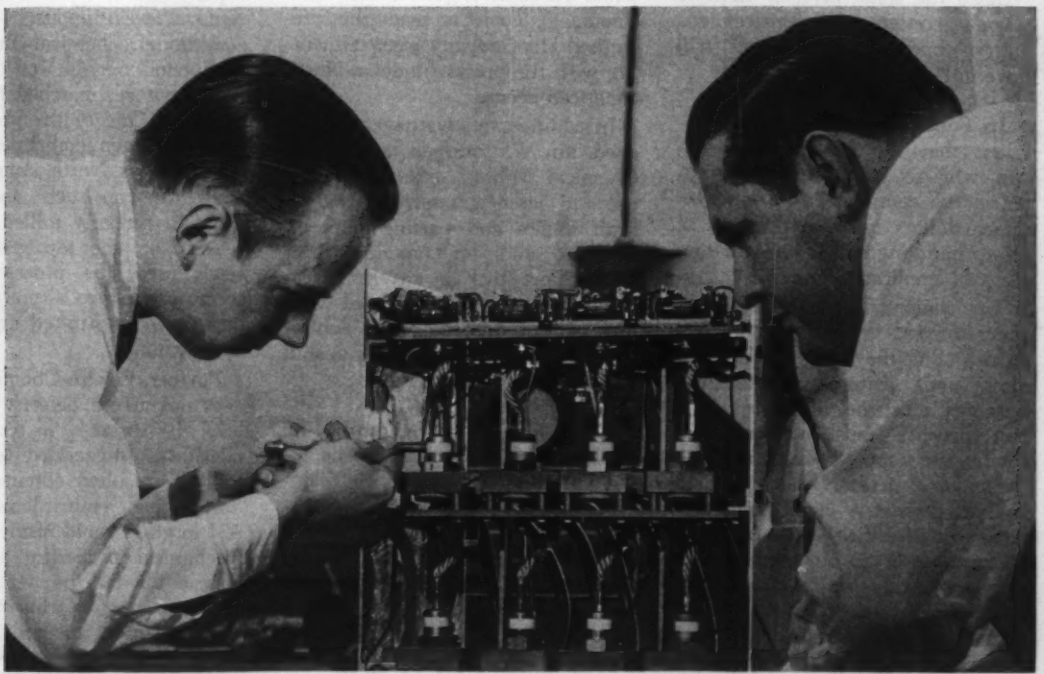
Power Rating Versus . . .



practical. It's being used in missiles, submarines, and emergency power systems by the armed services, and "many more military applications are being explored," Mr. Duckett reports.

Commercial and industrial applications are just beginning to evolve, but Westinghouse expects them to grow rapidly. One of the more important is the conversion of alternating current from one frequency to another. It gives the engineer a new variable in designing electrical equipment. And with frequency change, we can look forward to high frequency lighting, new motor designs, new alternating current power supplies, lower cost ultrasonic generators, and new concepts in speed control for mill operations.

• **Its Advantages**—Because it's free of moving parts, the semiconductor power inverter offers high reliability, low maintenance, and minimum noise. Its weight and volume can be much less than a motor-generator set (see charts). It is expected to be extremely efficient. As semiconductor materials and circuitry are improved, Mr. Duckett expects an efficiency of 95 per cent



This power inverter changes direct current to alternating current with no moving parts. Westinghouse's E. J. Duckett (right) and R. P. Putkovich examine the eight Trinistor semiconductor switching devices that are the basic elements of the system. The power handling capability of static inverters has jumped from a few watts two years ago to 150 kilowatts today. In a few years, they'll pass 10,000 kilowatts, headed for 100,000

—a loss through inversion of only 5 per cent.

Since the static inverter is made up of small, individual components, it can be designed in almost any geometric form.

Energy losses are extremely low when the units are at minimum or maximum conduction conditions; high losses occur under operating conditions where the unit is not fully turned on or off. So circuitry must permit it to be operated only that way. Switching time must be made as rapid as possible.

The power handling capabilities of single units have increased ten times in the last two years. That ability will be increased by 30 times the present limit in the next five years, believes Mr. Duckett.

• **Its Drawbacks** — When overloaded, the system has no inertia and little thermal energy storage; there's a chance that excessive voltages or currents may cause failure of the semiconductor elements, Mr. Duckett admits. So it is frequently necessary to add protective circuitry — increasing circuit complexity.

Since the static inverter employs a new concept of electrical circuitry, operating personnel will have to be trained.

• **Its Future**—Westinghouse is confident that the new inverter system will get good market acceptance; the company is plowing research dollars into improvement of power handling ability and enlargement of application areas.

The company notes that motor-generator sets are efficient and reliable. But they are rotating devices and require maintenance. Bearings must be lubricated; carbon brushes must be replaced; commutators must be serviced. And the motor-generator has a relatively fixed geometry—it may not permit the most efficient use of space. Output power is not immediately available unless the machine is kept rotating constantly. Those are the points in conventional units that Westinghouse plans to circumvent with the static system. But the motor-generator can withstand overload conditions for a reasonable period—a factor which must be considered in the static units.

New Milling Process Trims Complex Shapes

FIFTY production steel forgings, used on North American Aviation Inc.'s A3J jet airplane, are being electrochemically milled to remove decarburized surfaces. The process, developed by the company's engineers, is the latest in line of electromachining techniques.

Submitting the high strength steel parts to electrolytic attack in an acid solution, the engineers can also accomplish over-all metal removal for weight reduction, selectively machine specified surfaces, and refine the tolerances of the part.

• With further development, the process is expected to be widely used.

At a production meeting of the Society of Automotive Engineers Inc. in Cleveland, Arthur Watson, senior research engineer, Cleveland Pneumatic Tool Co., made that prediction. His company is experimenting with the process under a North American license.

In addition to advantages already cited, Mr. Watson feels the Electro-Chemical Milling process may be used to alter contours, to reduce draft angles and parting lines on forgings, and for tapering sheet stock. Sheet stock, in any heat treat condition, can be perforated with any pattern desired. North American is also using the process to mill pockets in sheet steel.

• Depth of removal is controlled by the amount of current and time.

With the temperature and solution concentration within the operating range, Mr. Watson says the correct metal removal can be assured within a tolerance of ±0.007 in. The metal is removed at the rate of 0.012 in. an hour. Only 26 kilowatt hours of electricity are required to remove 0.040 in. of stock from an area of 1 sq ft. That equals about 1½ lb of metal. In removing the 0.040 in. from a rough forging, a surface finish of 45 to 75 microinches rms can be obtained. The figures are based on steels like AISI 4340 and the H-11 hot work die steels. Faster rates of removal are being obtained on stainless.

Mr. Watson lists these as the necessary parts of a setup: An acid resistant tank equipped with air agitation, refrigeration, and an exhaust system for removal of the acid fumes, a source of direct current either with generators or rectifiers, and hot and cold water rinse tanks.

• The process differs from chemical milling.

Unlike conventional chemical milling, the process submits the metal to electrolytic attack. An oxide film forms on the metal's surface. The film is soluble; it dissolves as rapidly as it is formed, so metal removal is continuous.

Although chemical milling is a production regular on aluminum, it has not yet matched that stature on steel. One of the problems has been hydrogen embrittlement. Mr. Watson says North American tests show that no such embrittlement exists in properly milled parts.

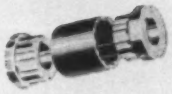
Also, on the top grade aircraft steels used, the process does not seem to produce a preferential attack, even in stressed areas created by machining.

Further, Electro-Chemical Milling does not accent defects; it tends to level the surface. So scratches that might be exaggerated by chemical milling are often eliminated.

Hydrogen embrittlement of the A3J forgings could result in lowered mechanical properties and shorter fatigue life for the parts. The removal of the decarburized surfaces by mechanical methods, created a production problem.

Electro-Chemical Milling has solved the problem and already is on the way to becoming a production reality on many of the high property steel alloys.

PowerGrip FLEXIBLE COUPLINGS

These couplings are so simple in design  that their cost is LOW compared with other couplings. Insist on having U.S. PowerGrip Flexible Couplings tried on your machinery and then watch your costs go down. Installation is quick and easy. No maintenance, no lubrication. Call now!

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Two color pyrometer measures the temperature of pig iron in the runner of a blast furnace. The detector head is aimed at the clean stream near the skimmer

Two Color Pyrometer Tells Correct Temperature

AN INSTRUMENT that measures the ratio of radiation from a heated object at two selected wave lengths —or color bands—offers accurate measurement of temperatures above 1400° F for metal making and processing industries.

Called the Shawmeter, it is manufactured and marketed by Shaw Instrument Corp., Latrobe, Pa. It is also merchandised by Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill.

• It has been used by one steel producer to check the temperature of hot metal as it leaves the blast furnace.

The instrument was purchased by the Applied Research Dept. of Ford Motor Co.'s Steel Div. primarily for test measurement of pig iron temperatures in the blast furnace runner.

The instrument measures a radiation ratio instead of the absolute radiation level, so it is relatively immune to differences in surface emissivity of the material being observed, Ford's researchers report. Its readings aren't seriously affected by distance or by intervening haze or smoke.

In tests, only heavy slag patches produced false readings; those conditions were easily recognized. Best spot for observation of the metal stream: Near the skimmer, where a clear surface is exposed.

Temperature changes of more than 100° F were often noted during a cast. That indicated the need for continuous temperature readings, instead of a single check before tapping the blast furnace.

In laboratory tests, the instrument agreed within 15° F with platinum-platinum-rhodium thermocouples in the 2000 to 2800° F range.

A portable unit was used for the tests. Research personnel are recommending installation of the instrument on a fixed mounting to record casting temperatures.

• Another company is evaluating the instrument for steel plant applications.

In the research laboratory of Allegheny Ludlum Steel Corp., at Brackenridge, Pa., Dr. D. L. Burk has used the pyrometer to measure the temperature of molten metal as it is poured from a small air induction melting furnace designed for research heats.

The pyrometer is also used at Brackenridge to measure bath temperatures in a vacuum induction melting furnace. The radiation detector is aimed at the surface of the molten metal through one of the viewing ports. A continuous record of the bath temperature is provided by a strip recorder.

Several other applications of the pyrometer to steelmaking temperature measurement are being investigated by Allegheny Ludlum.

• The pyrometer looks promising in many metallurgical applications.

The instrument has been tried by one steelmaker to read the temperature of hot metal being poured into an oxygen steelmaking vessel. By keeping a close check on that temperature, the melting crew would know how much scrap could be added to the converter without freezing the heat.

The pyrometer has been used to check the temperature of strip steel passing through a catenary annealing furnace; it has also been applied to foundry work—measuring the temperature of hot metal in the transfer ladle, just before it goes into a centrifugal casting setup.

A tool steel producer used it to check the temperature of hammer forgings and steel passing through a rolling mill.

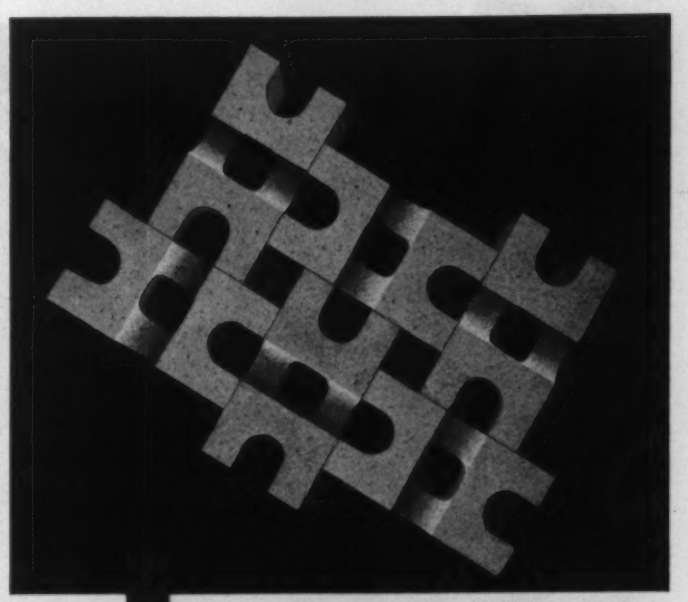
The temperature of salt baths, like those used to anneal high speed steel, can be read by the pyrometer. The bath surface is somewhat cooler than the interior, but the instru-

(*Please turn to Page* 148)

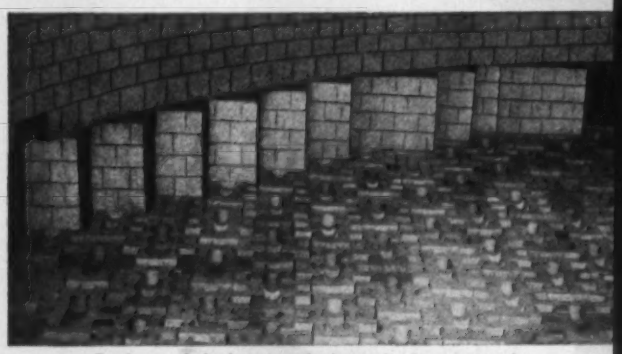
New design provides

25% to 50% GREATER HEATING SURFACE

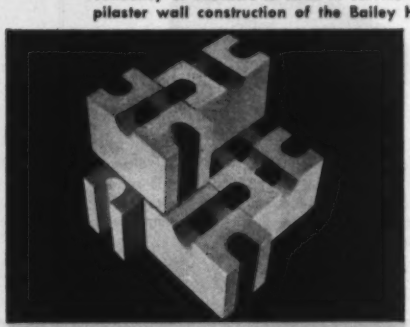
than ordinary basket weave checkers



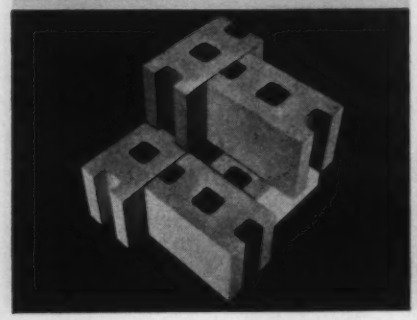
KENNEDY BLAST FURNACE STOVE CHECKERS



Tendency of checkers to twist in service is overcome by pilaster wall construction of the Bailey Hot Blast Stove.



The regular Kennedy Checker (above) is of 3-hole design with unobstructed flue openings, 1¼" minimum wall thickness and a cross flue. It also can be furnished (below) without the cross flue feature.



This new 3-hole checker shape is laid in basket weave style to produce a solid 1¼" wall between each flue. This assures greatly increased heating surface without sacrificing the advantages of basket weave design.

The increased heating surface of the Kennedy Checker results in a correspondingly lower stack temperature. This makes possible the use of a modern steel bottom for supporting the checker system.

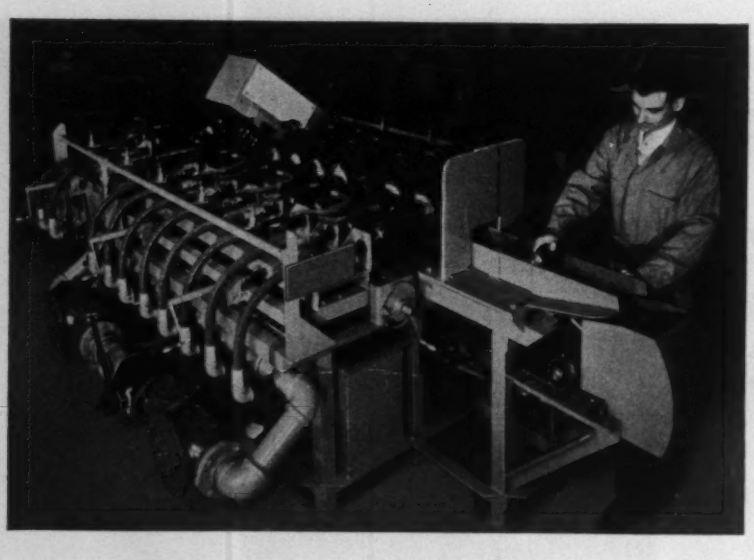
Write for Bulletin

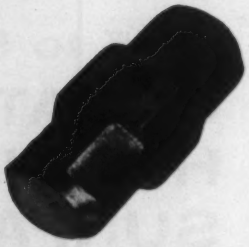
WILLIAM M. **Bailey** COMPANY

ENGINEERS

LEADERSHIP THROUGH QUALITY

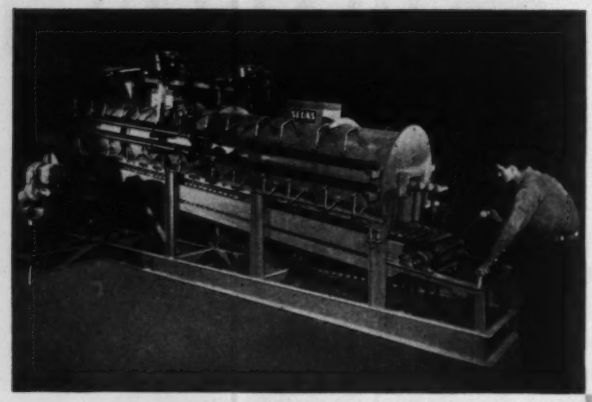
1221 BANKSVILLE ROAD PITTSBURGH 16, PA

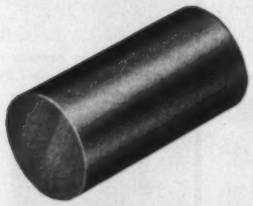




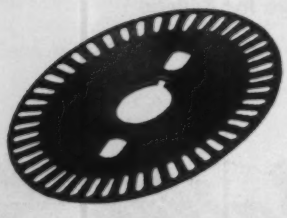
SELECTIVE HARDENING: Both faces of sledge-hammer-heads are selectively hardened and tempered in a continuous operation. Tempering, previously requiring hours, now performed in minutes. Machine handles wide variety of sizes, shapes and widths of heads. Integration with preceding grinding step enables operation of machine with no additional labor.

Here's How Industry Cuts Costs

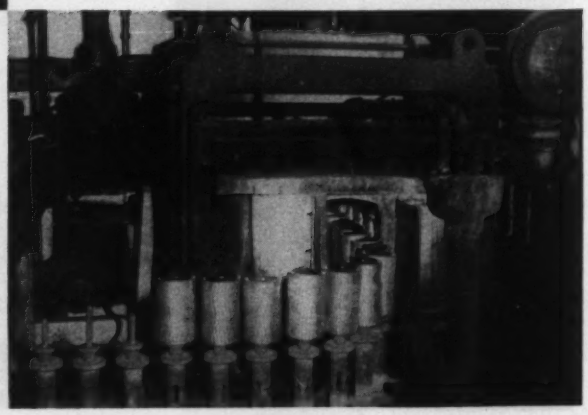




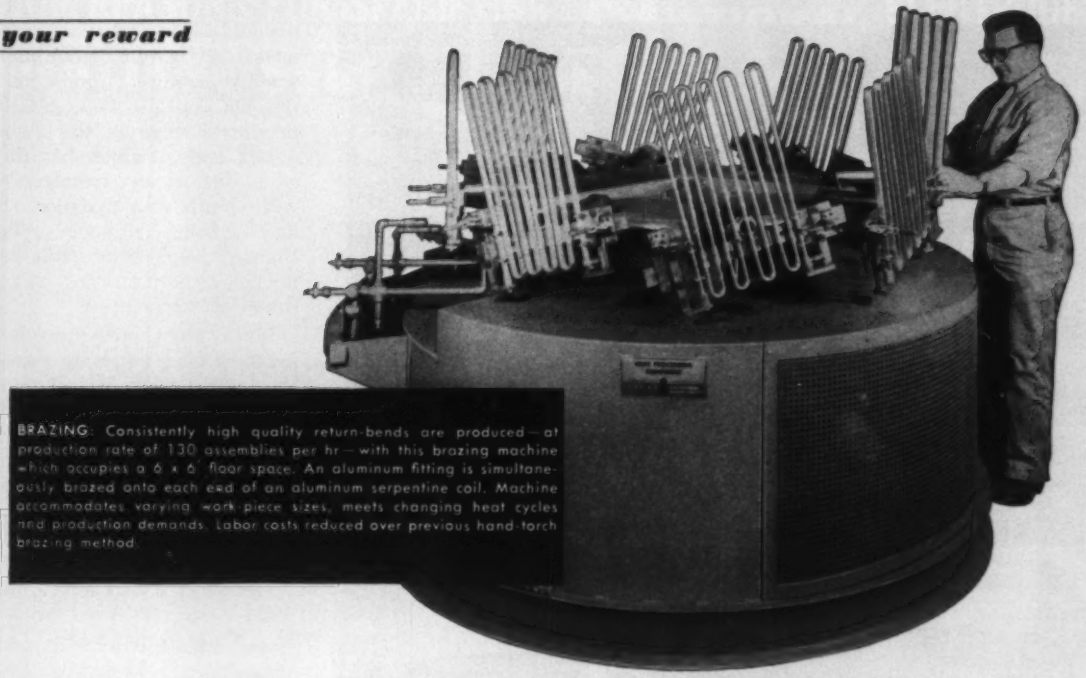
HEATING FOR FORGING: Brass slugs—⅜ to 2" diam., 2½ to 8" long—are heated to 1390°F in this automatic machine at high production rates. Selas fast, uniform heating produces fine grain size, improved physical properties.



ANNEALING: Electric motor stator and rotor laminations are annealed to develop required electrical characteristics. Laminations, 2½" to 10" O.D., stacked 6" high on spindle fixtures, are heated uniformly and quickly, then control-cooled, in continuous operation. Complete cycle takes only 35 min, increases production rates substantially over conventional methods.



is your reward



BRAZING: Consistently high quality return-bends are produced—at production rate of 130 assemblies per hr—with this brazing machine which occupies a 6 x 6 floor space. An aluminum fitting is simultaneously brazed onto each end of an aluminum serpentine coil. Machine accommodates varying work-piece sizes, meets changing heat cycles and production demands. Labor costs reduced over previous hand-torch brazing method.

Improves Product Quality

with SELAS heat processing equipment

The installations on these pages demonstrate how Selas automatic heat processing equipment

- cuts operating costs
- increases production rates
- minimizes in-process inventory
- reduces labor requirements
- saves valuable floor space
- improves product quality

Specifically designed and custom-built to meet your individual production requirements and job specifications, Selas heat processing equipment employs time-proven standardized engineering features for longtime operating dependability and minimum initial investment. Problems usually associated with divided responsibility are avoided since Selas starts-up and services every machine it designs and builds.

Selas automatic or semi-automatic heat processing equipment can help you produce better products at lower costs. At your convenience—without obligation to you—a Selas field engineer would welcome the opportunity to survey your requirements.

For this free, personal service, or for literature on any of the heating operations shown here, write Mr. W. B. Troupe, General Industry Div., Selas Corporation of America, 24 Dreshertown Road, Dresher, Pa.

See
an operating demonstration of Selas brazing and metal heating equipment
at
BOOTH 1001
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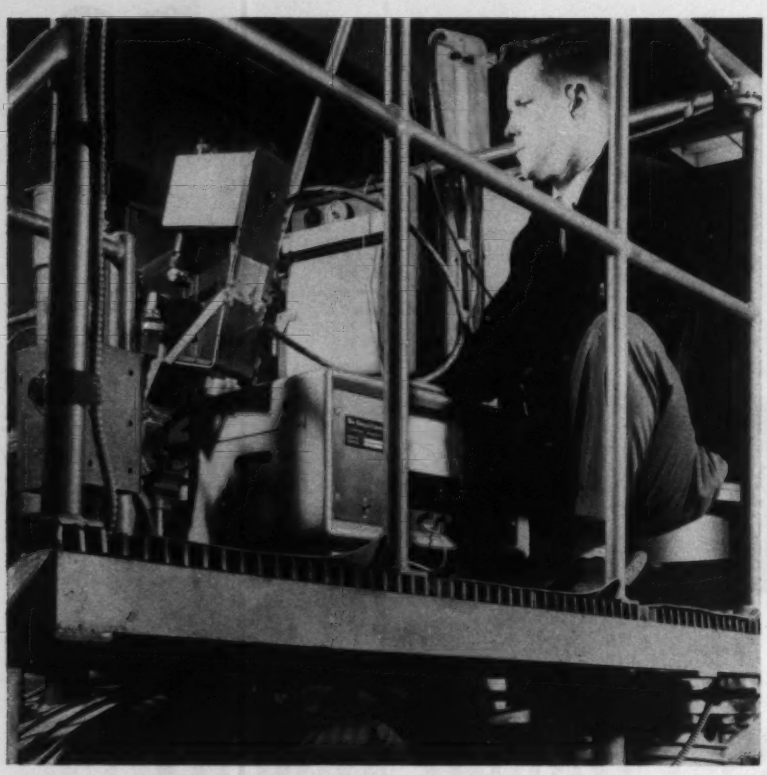
HEAT AND FLUID PROCESSING ENGINEERS development · design · construction



Radiation detector is sighted through the viewing port of a vacuum induction melting furnace. A chart recorder provides a continuous record of bath temperature

(*Continued from Page* 144)

ment can be calibrated to read the true bath temperature.

The instrument can be connected to furnaces through a control system for automatic temperature regulation.

• Errors often occur in temperature measurement because radiation from a heated body doesn't always correspond to the temperature inside the body.

If a measuring device could be inserted into a mass of hot metal, it could sense radiation inside the metal and permit determination of true temperature. Conditions inside the hot, opaque mass closely approximate those of the theoretical "black body," which has no color of its own at any temperature and will absorb any radiation striking its surface, without reflection. Emitted black body radiation has no color characteristics other than those of temperature.

Many attempts to measure temperature of a hot body depend on the measurement of radiation from one of its surfaces. Such radiation is partially reflected inward from the surface. The ratio of radiation emitted from a material to radiation from a black body under the same conditions is called the emissivity of the material.

Emissivity differs for various materials, and it varies with wave length and temperature.

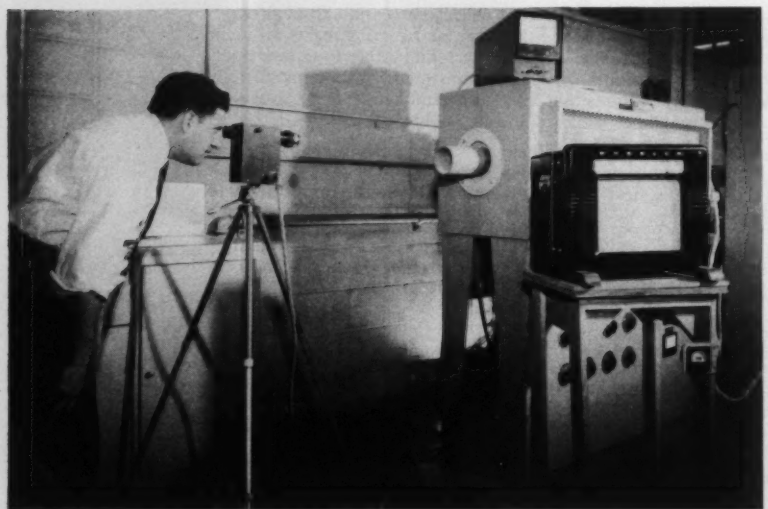
• The pyrometer is said to bypass the problem of emissivity.

It is designed to measure the ratio of radiation emitted in two wave length regions, says Vincent G. Shaw, president of Shaw Instrument Corp. and developer of the instrument. If the heated body has the same emissivity for the two wave lengths involved, emissivity can be disregarded and a true radiation-temperature relationship can be assumed.

Some metals reflect selectivity—they show a definite color under white light. Actual radiation (at all wave lengths) from such materials at a given temperature differs from theoretical, or black body radiation. But most materials don't have that characteristic, and the difference usually decreases as temperature increases.

A black body temperature can be determined, at which the radiation difference is nearly constant. Called the "color temperature" of the material, it has the same relative wave length distribution of intensity as the body being measured and causes the same color sensation. Correction can be made for the difference between color temperature and true temperature in calibrating the instrument, says Shaw Instrument's president.

The difference between true temperature and color temperature for various materials is said to change



Two color instrument checks temperatures in a tube furnace used in the production of semiconductors. The furnace has 12 controlled temperature zones

MAJOR REASONS FOR SPECIFYING NATIONAL ELECTRODES...

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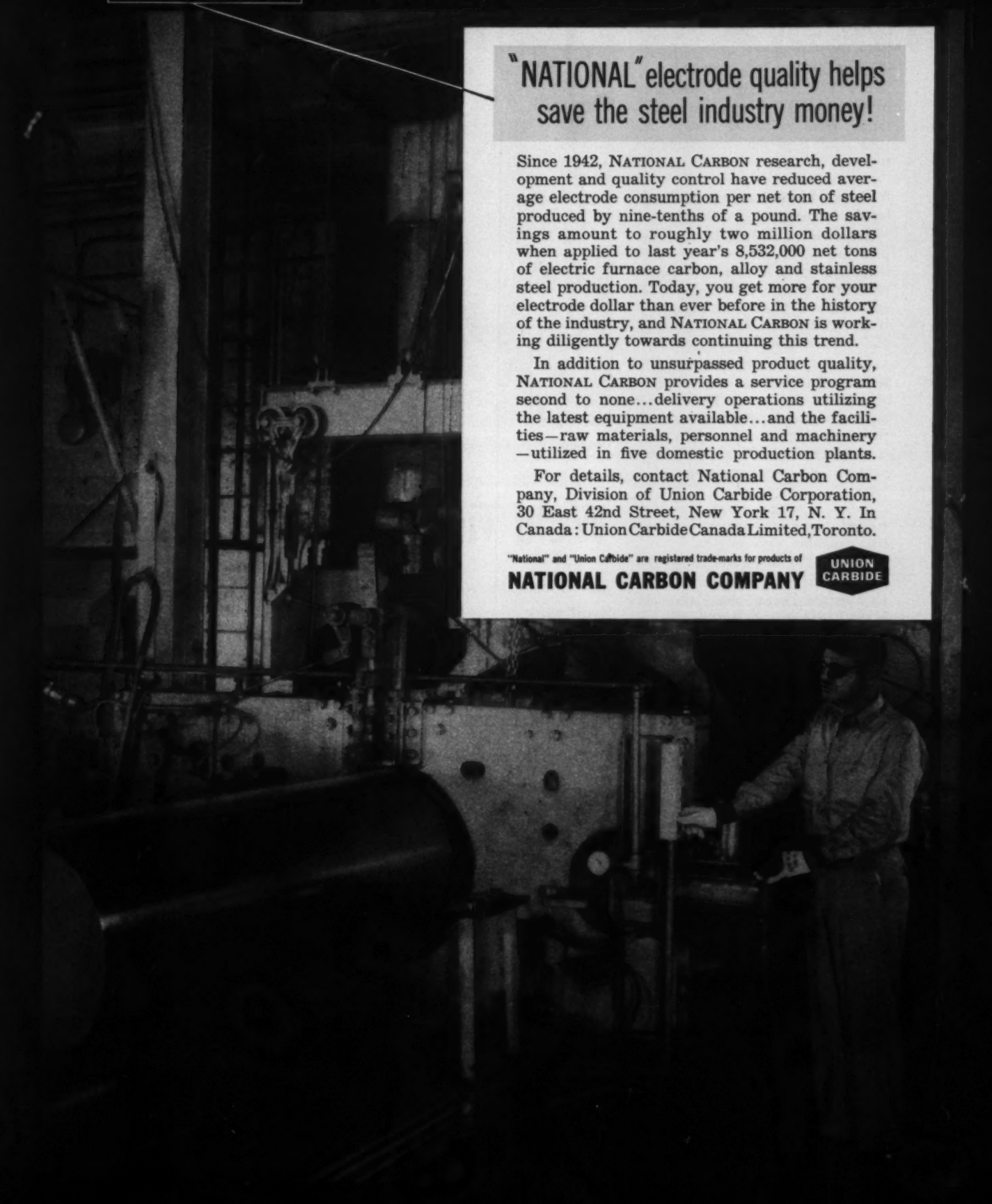

"NATIONAL" electrode quality helps save the steel industry money!

Since 1942, NATIONAL CARBON research, development and quality control have reduced average electrode consumption per net ton of steel produced by nine-tenths of a pound. The savings amount to roughly two million dollars when applied to last year's 8,532,000 net tons of electric furnace carbon, alloy and stainless steel production. Today, you get more for your electrode dollar than ever before in the history of the industry, and NATIONAL CARBON is working diligently towards continuing this trend.

In addition to unsurpassed product quality, NATIONAL CARBON provides a service program second to none...delivery operations utilizing the latest equipment available...and the facilities—raw materials, personnel and machinery—utilized in five domestic production plants.

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UNION CARBIDE

little with temperature. For many materials, the difference is so small that no correction is necessary. That isn't true for some materials. Here's one example: For molybdenum, the difference varies from 16.2° F at a true temperature of 1880.6° F to 57.6° F at 3140.6° F. Assuming a constant correction of 37° F over the entire range, readings would always be within 21° F of the true temperature.

• Other advantages are claimed for the instrument.

Areas viewed and the lens system used are the same for both wave lengths studied. That makes it unnecessary for the field stop to be constant and filled with radiation. It also makes variations in contour and surface of little consequence.

Accuracy of the instrument isn't seriously impaired by small patches of oxide or slag on the heated material. The only effect of oxide at the same temperature as the metal is a slight variation in the difference between true and color temperatures.

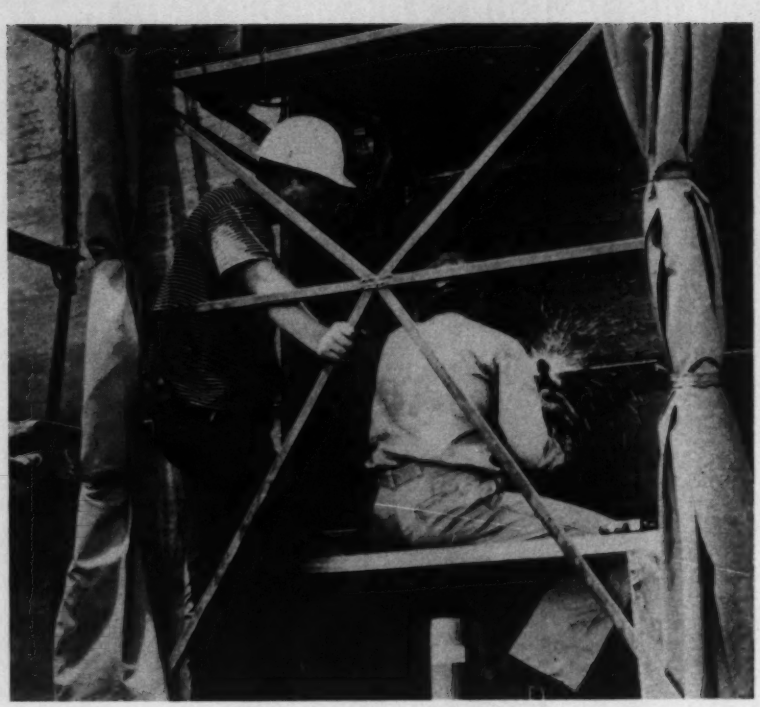
• One sensing element receives both radiation wave lengths.

A two color pyrometer could use two different photosensitive elements to scan the heated object through filters passing separate spectral bands, then determine the ratio between emitted energies in those bands. The ratio could then be converted into a temperature reading.

But relative sensitivities of the elements would have to be constant. The photosensitive elements might be affected differently by environment changes, so such an instrument could be used only under laboratory conditions.

Use of a single photosensitive element, on a time sharing basis, to measure radiation at both wave lengths, makes the instrument more reliable, says Shaw Instrument. Indicated temperature is related to the ratio of the two intensities, so changes in sensitivity don't affect the reading.

The two wave bands of light are monitored in rapid sequence—the measuring cycle lasts about one-sixtieth of a second. About six cycles are required to determine the correct temperature.



Operator uses Unionarc to weld outside seam of tank 150 ft in diameter

Weld Time Cut 60 Per Cent

Semiautomatic welding and ingenuity make joining of 150 ft oil tanks three times faster than former method. Savings from three tanks paid for equipment

A SWITCH from manual to a semiautomatic system reduced welding time more than 60 per cent in erecting several multimillion gallon oil tanks, reports D. S. Reichle, assistant manager, Ellerbee Bros., Port Arthur, Tex.

The method (Unionarc) laid down three times as much metal in one pass as the former, covered electrode method. Cleaning costs were cut 66 per cent. Also, the firm saved enough in labor alone in welding the first three tanks to pay for the new equipment.

• The big tanks required 1-1/32 in. thick plate for the lower ring. The outer shells alone required 9500 ft of welding. Many welds were vertical.

The Unionarc system employs a wire fed, hand gun which has provisions for a magnetic flux carried in a stream of carbon dioxide for shielding.

When using manual covered electrodes, operators used to take up to four passes for each seam, outside and inside. The Unionarc does it in two—one outside, the other inside.

Mr. Reichle says that the device permits easy welds in vertical, horizontal, or overhead positions and eliminates stops to change electrodes. Smooth x-ray quality welds were the rule even when welding plates with moderate amounts of rust, scale, and moisture. (All joints were radiographically checked.)

Ellerbee Bros. built a motorized buggy to carry the equipment and operator. Flanged wheels ride the top edge of the tank. The device is said to have eliminated much operator fatigue experienced with conventional scaffolding.

This is

Stuart's

new
HI-D
at work

This is what HI-D is . . .

A new *transparent* metalworking compound a *petrochemical* compound possessing the high detergency of synthetics but none of their disadvantages. Often described as a hybrid—Hi-D is not truly an emulsion, and not anything like a straight chemical compound. Turn the page to see how this new type of cutting fluid can help you.

This is what

Stuart's

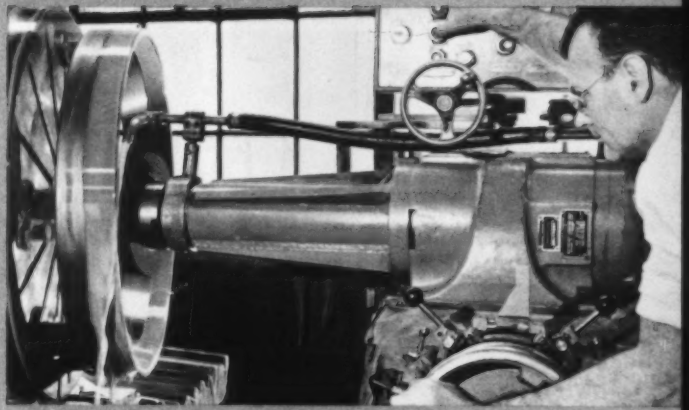
new **HI-D** will do...

Keep grinding wheels open and free-cutting. Permit standardization of wheels—do more different jobs with fewer wheels. Minimize machine tool maintenance. Aid chip formation to produce fine surface finishes. Lubricate efficiently as it cleans. Remain effective and stable at 60:1 for grinding and at 40:1 for cutting—even after picking up tramp oil. Settle chips quickly in an ordinary sump—produce controlled foam in a flotation-type filtering system. Inhibit rust, even at mixtures greater than 60:1.

This is how

Stuart's

new **HI-D** has helped others...



LaSalle Steel Company reduced cutting fluid costs by 45%, using Hi-D for everything from ¼" roughing cuts on lathes to fine finish grinding. At 50:1, Hi-D stops in-plant rust on highly finished steel bar stock.

The Torrington Company, Bantam Bearing Division, saves ⅓ on lubricant costs by using Hi-D at 60:1 on 87 grinders. Hi-D trims *hidden costs,* too, because Torrington dresses wheels only ⅓ as often as before. Think of the savings in wheel and diamond life. Direct costs are slashed on some jobs because both rough- and finish-grinding are done with the same wheel. As for finish, Hi-D eliminates 95% of chip "feedback" from the filtering system.

Stuart's **HI-D** replaces five cutting fluids in diversified plant

Here's how Hi-D's combination of detergency and lubricity slashes lubrication costs for one company on 20 different jobs that range from sawing to surface grinding:

1. **Sawing**—Elimination of chip welding improves blade life. Ability to perform at 10:1 (5:1 formerly required) reduces carry-off and waste.
2. **Turning**—Production is increased by stepping up feed from .030 to .060 ipm. Depth of cut is increased from ⅜" to ¾".
3. **Mills**—Rancidity is eliminated.
4. **Surface grinding**—Wheel life is increased, downtime is decreased, because petrochemical compound Hi-D keeps wheels open and free-cutting.

On every application, Hi-D matches or betters the performance of five compounds replaced. Cutting fluid inventory and handling costs are reduced. Using Hi-D in the toolroom and cutoff department (serviced by a central system) saves 50 to 60 gallons of cutting fluid per week.

The way to evaluate potential savings in *your* plant is to test Stuart's new Hi-D on a variety of operations. Or, send for free test samples of Hi-D in both concentrate and mixture form that will demonstrate its transparency, lubricity, and stability. Phone your Stuart representative or the factory—BIshop 7-7100.

FREE SAMPLE

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Coating Is Soldering Aid

Tarnish on silver plated surfaces resulted in unsatisfactory soldered joints on electric contacts for office machines at Friden Inc., San Leandro, Calif. A chromate coating solved the problem.

The tarnish came from atmospheric exposure and handling.

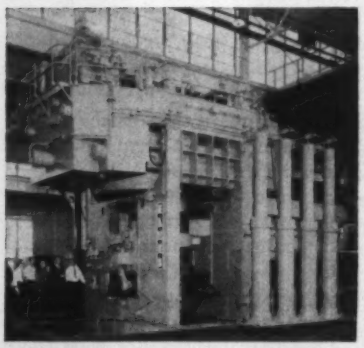
Application of Iridite 18-P, made by Allied Research Products Inc., Baltimore, now protects the surface between the time of plating and soldering.

The plated parts are immersed in the chromate solution for about 2 minutes, followed by a rinse and air-dry cycle. After processing, the parts may be stored for as long as six months without danger of tarnishing and subsequent unsolderability, reports Friden.

In addition, the treated parts resist the tendency to finger mark (body acids cause corrosion and decreasing solderability). Another advantage: The parts remain bright and attractive.

Close control over the process is maintained by checking the pH value twice daily.

A constant visual inspection is made of every batch to prevent formation of Iridite film.



HYDROSTATIC PRESS can exert 20,000 psi working pressure to compact various materials (test pressure is 30,000 psi). The unit, over 25 ft high and weighing about 265 tons, was manufactured by Elmes Engineering Div., American Steel Foundries, Cincinnati. It was designed for the U. S. government in co-operation with the University of California (Los Alamos) and the Atomic Energy Commission. The fluid power system includes pumps and valves made by Oilgear Co., Milwaukee

Most Important Event in METALWORKING

1960 ASTE TOOL SHOW and CONFERENCE

530 exhibitors will be on hand to show and demonstrate more than 6,000 products . . . machine tools and attachments, precision control and inspection equipment, automation devices, cutting tools, dies, jigs and fixtures . . . everything, in fact, that's *new* in tools and tooling. It's your best opportunity to see, study, compare . . . under one roof, at one time . . . the most modern, scientific methods, processes and tools in metalworking.

Equally important, the Tool Engineering Conference, with its 36 technical sessions, 70 outstanding papers, offers you an opportunity to learn about and discuss the latest technical advances and developments in the science of tool engineering.

There'll be plant tours, too . . . a chance to see and study, in actual operation, product and process methods in the world's major center of high-volume production.

All of these scientific and educational attractions, and more, will bring more than 35,000 metalworking management, engineering and production men to the 1960 ASTE TOOL SHOW. Make sure you're one of them! Write or wire immediately for your rapid registration forms.

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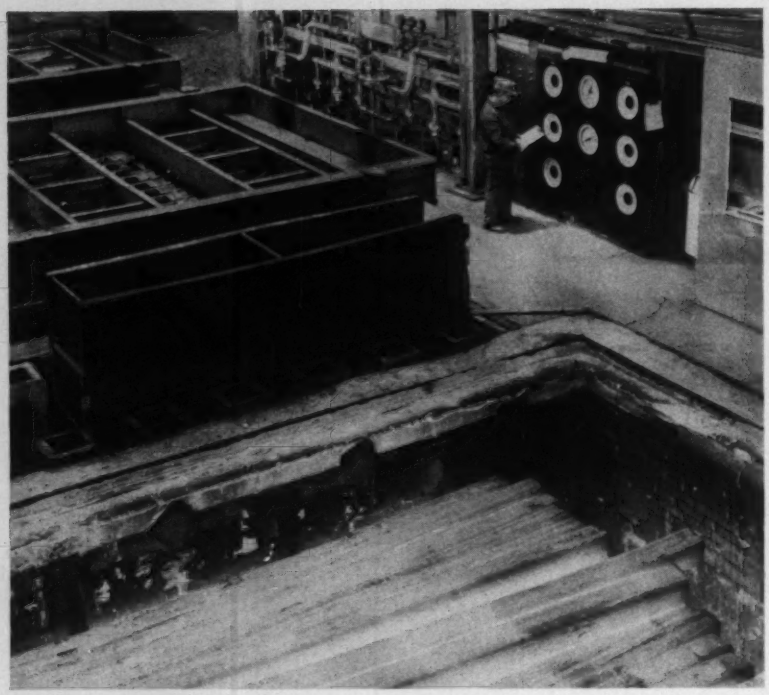


Hot blooms, charged into an isothermal furnace in Timken's conditioning department, will cool in one to two days vs. 10 to 12 in an unfired pit

Transformation Is Faster With Controlled Cooling

Isothermal pits at Timken plant bring about changes in crystalline structure of blooms within narrow temperature range and in fraction of time formerly required

BLOOMS are cooled in isothermal furnaces to speed crystalline structure changes in the conditioning department at Timken Roller Bearing Co.'s Steel & Tube Div., Canton, Ohio.

Performance of the first unit, converted from annealing service, prompted the company to install seven more. Two new furnaces were installed in 1959.

• Isothermal transformation permits dissolved gases to escape from the steel, preventing internal ruptures.

Krupp steel, nickel alloy, and high carbon alloy steels are processed in the furnaces.

As steel cools after rolling or forging, its crystalline form is changed, or transformed. In isothermal transformation, cooling is retarded, so the change can take place in a narrow temperature range.

During transformation, capacity of the steel to hold dissolved gases is reduced, and large quantities of gases are liberated inside the metal. Those gases should be liberated at a relatively high temperature, so they can escape readily from the steel. Internal flaking or bursting may occur if the gases remain in the metal.

Crystalline structure of the steel becomes more sensitive to internal gas pressure when transformation is allowed to take place at lower temperatures. That increases the danger of internal rupturing.

• Cooling time is reduced, and transformation is more predictable.

The isothermal pits take advantage of heat instead of time, forcing the steel to transform at 1100 to 1300° F. Transformation is completed in one to three days. That cuts down the leadtime required in scheduling orders and permits reduction of in-process steel inventories.

Previously, unfired pits were used; cooling usually took 10 to 12 days. Transformation temperature was dependent on the charging temperature, the mass charged, and the charging rate. The mass of hot steel had to be large enough to heat the pit and provide satisfactory cooling. Those factors couldn't always be controlled.

• The gas fired furnaces (mounted in the shop floor) are zone heated.

Designed and installed by Timken personnel, the furnaces are arranged in banks of four in a concrete vault, with the furnace tops about 2 ft above the floor level. That permits covers to be installed or removed easily with overhead cranes.

Each furnace is 24 ft long, 5½ ft deep, and 9½ ft wide. Stainless steel rails on the sides and bottom permit free circulation of heated air around the charge. The side rails also protect furnace walls from the crane magnet during loading and unloading.

Each furnace is divided into three controlled heating zones, which insure uniform temperature, regardless of the size of the furnace charge. Automatic controls regulate temperatures in the zones. Without zone heating, a partially filled furnace would overheat in those areas where no blooms were stacked. A thermocouple placed in the center of the charge records temperature for cycle control during heating and cooling.

One operator handles each bank of four furnaces. He sets and checks the controls, and lifts the covers with a gantry crane that straddles the furnaces. The covers are interchangeable and can be stacked, so two or more of the pits can be opened at a time.

A sand filled trough in the top edge of each pit prevents air from escaping. It also causes pressure to build up inside the furnace and makes for uniform heating.

'Ferris Wheel' Machine Doubles Shaft Runs

Parts ride a trunnion past the machining heads. Tools machine both ends in one cycle

BOTH ends of camshafts are processed in a single machine at the Cleveland engine plant of Ford Motor Co. The two way, horizontal machine doubles production by processing two parts in each fixture.

The revolving trunnion machine, made by Morris Machine Tool Co., Cincinnati, utilizes a four station, automatic index to drill, ream, and tap an estimated 186 camshafts an hour at 80 per cent efficiency.

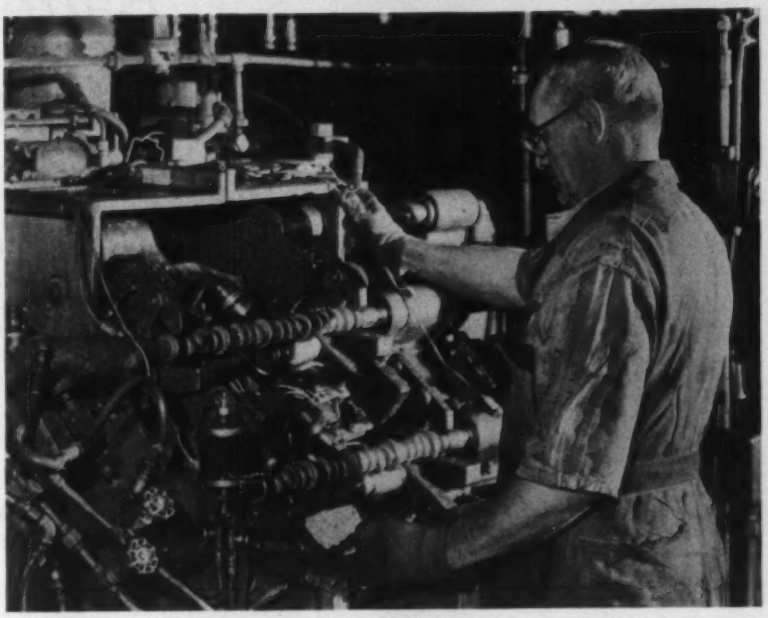
Ford specifications call for one hole drilled and tapped in the left-hand end of each part, and two holes drilled and reamed in the right-hand end. By incorporating multi-spindle heads and two position, free floating fixtures on the indexing turret, the machine reduces both initial and operating costs, as well as increasing production.

• **Three Units** — The machine is composed of three synchronized units. The left-hand end of the equipment includes a hydraulically operated slide unit with a four spindle head for Stations 2 and 3, and a lead screw tap unit with a two spindle head for Station 4. The right-hand end of the machine utilizes a self-contained hydraulic unit with a ten spindle head and cluster construction.

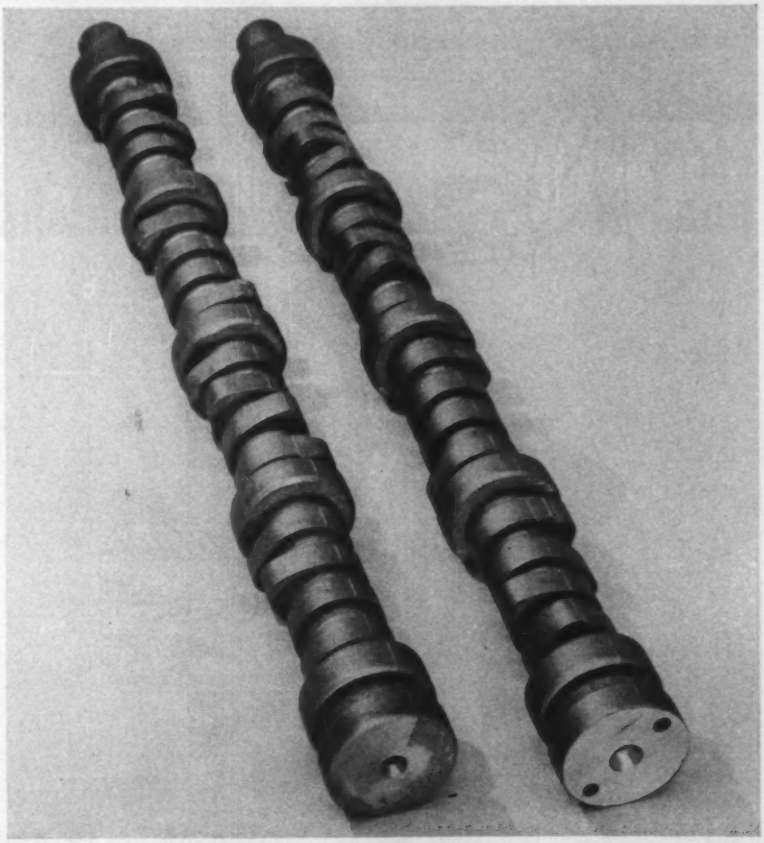
The operator loads two camshafts on air operated centers carried on the machine frame, locating work longitudinally by center bearing and radially by cam lobe.

The work is clamped hydraulically, and then the centers withdraw. Pressing a pushbutton starts the index of the machine, the turret indexes, heads rapid traverse, feed, dwell, and quick return.

The operator's work is restricted to unloading and loading two pieces at each indexing. The rest of the operation is automatic. At each index of the work-carrying trunnion, the opposing horizontal tool clusters activate. As soon as the trunnion is loaded, two parts are completed with each indexing.



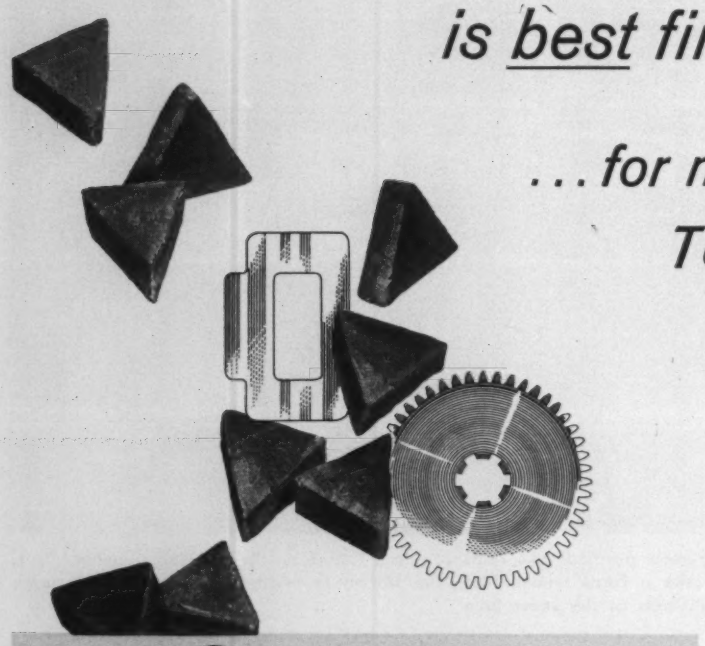
The operator positions two camshafts in a fixture on the machine trunnion. Parts index (like a Ferris wheel) from one station to another. Machine heads work on both ends at the same time

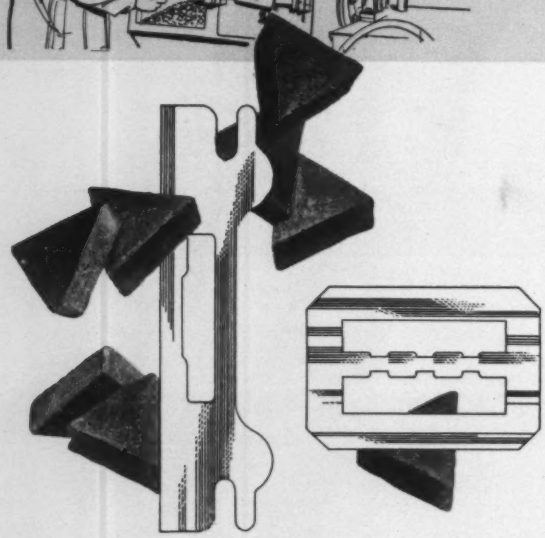


Ford is machining the ends of these camshafts at a rate of 186 an hour

Barrel finishing is best finishing

. . . for many jobs use TUMBLEX "T"*





Don't let old-fashioned hand-finishing waste your production time and money.

Cut your cost-per-piece-produced by choosing the right barrel finishing equipment.

Cut this cost to very lowest by choosing the right Norton TUMBLEX *abrasive . . . available in five types and many sizes . . . engineered for best results covering the range of barrel finishing.*

For finishing intricate parts, TUMBLEX "T" abrasive comes in triangular, non-wedging shape. It is made of bonded ALUNDUM* abrasive, assuring "Touch of Gold" performance that includes long, even wear; fine, uniform finish; short time cycles and sure savings.

Send samples of parts you finish to our Sample Processing Department. We'll barrel finish, return samples, and report the methods and abrasive you need to improve quality and cut costs. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

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ABRASIVES

G-392

75 years of . . . Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

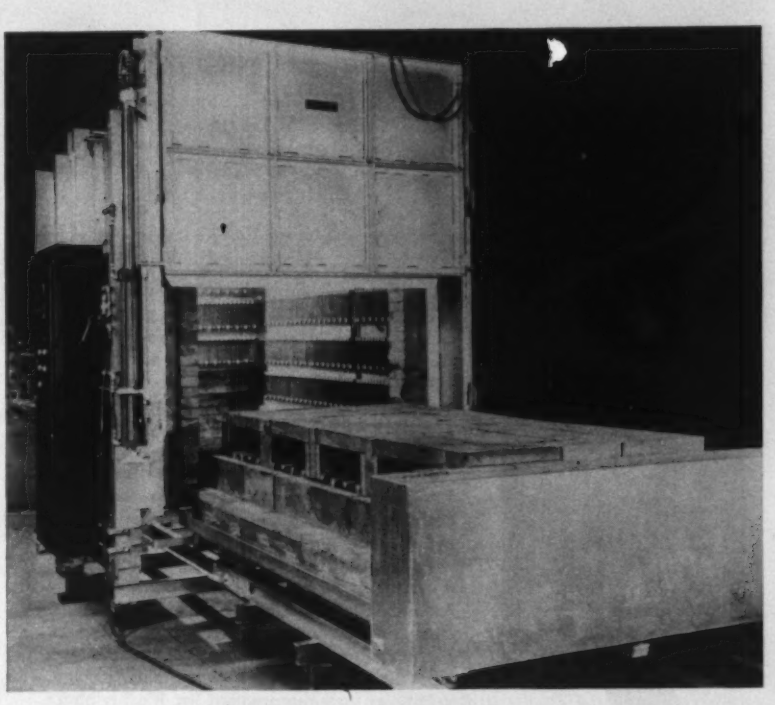
Car Bottom Furnace Maintains Uniform Temperature

MAXIMUM temperature variation is no more than 3° F in the Waltz car bottom furnace. Heating elements are installed in the side walls, back wall, the door, and under the hearth of the car. The elements are made of 80-20 nickel alloy and are connected to a 440 volt, 3 phase, 60 cycle line. Density on the ribbon is 10 watts per square inch.

The combination temperature control and electric panel is in a floor mounted cabinet. Furnace lining is 12 in. thick. Insulating firebricks and block insulation are used. Ties hold the bricks in place.

The unit is 48 in. wide, 32 in. high, and 96 in. long. A sand seal is on each side of the car; the car back nests into the back wall of the furnace to form a seal. An air cylinder on each side of the door is operated by a foot valve.

For further information, *write* Dept. 9, Waltz Furnace Co., 1901 Symmes St., Cincinnati, Ohio.



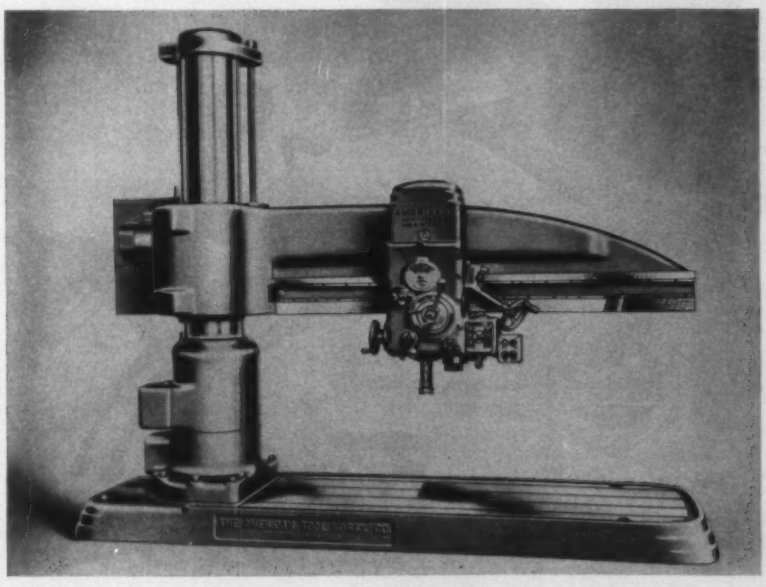
Radial Drill Available with Arms 5 to 14 ft Long

HIGH SPEED drilling, facing, and boring can be done with the Maxi-Speed Hole Wizard radial drill made by American Tool Works Co.

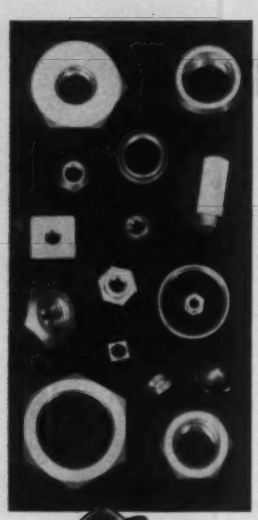
No additional equipment is needed for tapping operations. Holes up to 2 in. in diameter can be drilled and tapped in metals such as steel. Larger sizes may be used with proper feeds and speeds, says the manufacturer.

The units are available in column sizes from 13 through 19 in. in diameter and with arms 5 to 14 ft long.

In addition to manual feeds, the head provides 12 spindle speeds with three optional ranges, plus six power feeds with two optional ranges. The manufacturer says the medium duty radial drills will meet variable work requirements in manufacturing plants, maintenance de-



Fischer



produces "specials" every day!

When applied to precision nuts, "special" denotes more than just non-standard sizes, shapes and threads. It also means that advanced production facilities, specialized quality controls and extensive experience are necessary to produce and supply uniformly accurate custom nuts.

With production records on more than 3,457 different types of special nuts . . . both brass and aluminum . . . Fischer is capable of mass producing turned nuts to *your* exact specifications. In fact, all Fischer nuts are made to closer tolerances than required by American Standard B18.2-1955 specifications.

As the leading producer of turned nuts, Fischer also specializes in dependable "on schedule" deliveries and competitive pricing. Whatever your requirement, let Fischer quote on your next order for precision nuts . . . standards, specials or miniatures.

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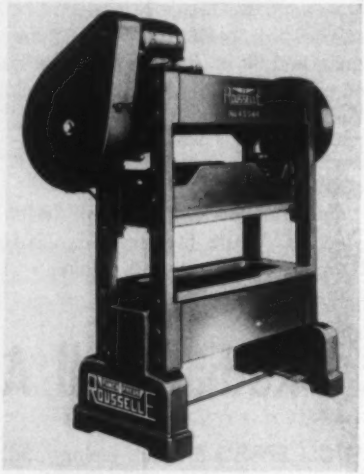
NEW PRODUCTS and equipment

partments, and structural steel plants.

For further information, *write* American Tool Works Co., Pearl Street at Eggleston Avenue, Cincinnati 2, Ohio.

40 Ton Press Has Bed Areas up to 6 ft

THE Rousselle press is suited for handling wide rolls or sheets of metal, plastics, paper, and leather. Four long ways provide a rigid, four corner ram support and make it adaptable for steel rule dies and a variety of multiple punches. Three sizes are available with bed areas up to 6 ft.



Standard die space is 12 in. (it can be increased up to 24 in.). An electrically controlled friction clutch to provide rapid, shockless starting and stopping at higher speeds can be provided.

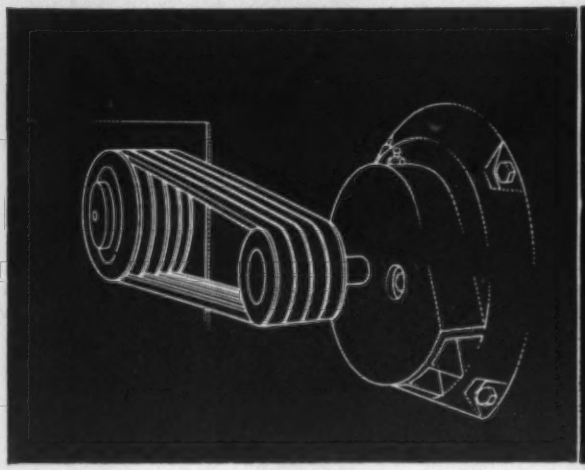
For further information, *write* Service Machine Co., 2310 W. 78th St., Chicago 20, Ill.

Sliding Sleeve Valve Helps Maintenance

A LOCKING feature on the Hunt line of sliding sleeve valves eliminates hazards of maintaining air operated machines with live air in the system. The three way version exhausts downstream air when in

BEFORE: This drawing of the former 4-belt drive on a clothes pressing unit is in the same scale as the photo of new Super HC V-Belt Drive at right. Heavy sheaves needed for 4 belts imposed high bearing loads.

AFTER: By redesigning the drive for Gates Super HC V-Belts only 3 belts are required and this Utah manufacturer saves 16 pounds in weight and 24% on the drive cost of every pressing unit it makes.



Manufacturer of pressing equipment cuts cost of drives 24%

New high capacity V-belt also saves weight and space!

This manufacturer is just one of many who have already turned to Gates Super HC V-Belts to achieve far more compact, lighter weight, lower cost V-belt drives for all types of machines. With new Super HC V-Belts, sheave dimensions can be reduced 30% to 50%, overall space up to 50%, and drive weight by 20% and more.

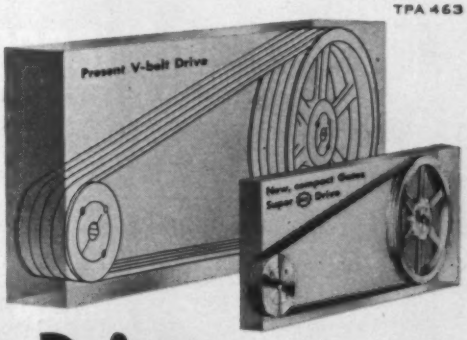
A product of Specialized Research in the world's largest V-belt laboratories at Gates, the Super HC V-Belt Drive is already standard equipment on production models in virtually every industry.

Engineering Service Nation-Wide

Whatever your plant's power transmission design problem, wherever you are, your nearby Gates Distributor or Field Representative is ready to assist you to cut space, weight, and costs with Super HC. Ask him for a copy of *"The Modern Way to Design Multiple V-Belt Drives."*

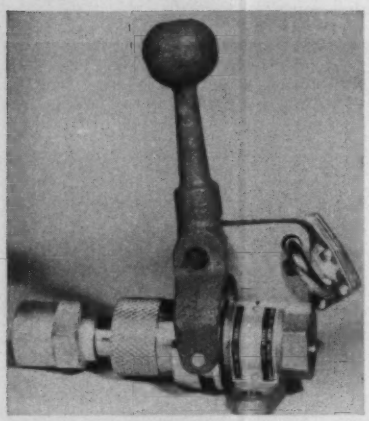
TPA 463

The Gates Rubber Company, Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario



Gates *World's Largest Maker of V-Belts*

Gates Super HC V-Belt Drives same hp capacity in smaller "package"



the off and exhaust position. It prevents loss of air pressure at the wrong time. Air is conserved during long shutdowns.

The valve can be padlocked in off and exhaust and on and flow positions with or without the exhaust shield. It's available in two and three way actions, manually or spring returned. Tap sizes range from 1/8 through 1 in.

For further information, *write* Hunt Valve Co., Salem, Ohio.

Electric Utility Ovens Have Vertical Air Flow

TEMPERATURES range up to 500° F in the Blue M mechanical recirculating electric utility ovens. A turbo-blower and a heavy duty motor are used to maintain the vertical air flow.

Wattage input for low, medium, or high temperatures is controlled by a power selector switch. An automatic hydraulic thermostat is used. The unit can be modified to include lead-in ports and a double glass door observation panel.

For further information, *write* Blue M Electric Co., 138th & Chatham Streets, Blue Island, Ill.

Wire Feed, Cutoff Unit Can Handle 3/16 in. Wire

YOU CAN measure, feed, and cut wire with an accuracy of 0.002 in. with the Ses-Matic feed and cutoff unit. The machine is adjustable to produce increments from 1 to 6 in. long. A speed control valve controls the number of cutoffs per minute.

Electrical controls provide stop and start. No adjustment is needed when changing wire sizes (within the range of the unit). Units are available for wire sizes up to 3/16 in. and stroke lengths from 1 to 24 in. Inclusion of wire straighteners is optional.

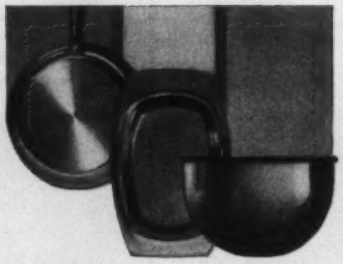
For further information, *write* Special Engineering Service Inc., 7630 Wyoming Ave., Dearborn, Mich.

High Frequency Stabilizer Converts ac, dc Welders

A HIGH frequency stabilizer for inert gas arcwelding (made by Metal & Thermit Corp.) converts any standard ac or dc welder for inert gas shielded arcwelding of aluminum, stainless, alloy steels, copper, magnesium, and dissimilar metals.

The unit supplies the necessary arc starting and stabilizing current without electrode contact with the work. A single switch controls high frequency, gas flow, water, and post-gas flow. High frequency stabilization is varied by an intensity control to suit job requirements.

The device operates from a 230 volt source and has a 0 to 600 ampere capacity. Controls include a gas valve, high frequency selector, gas afterflow, remote control cable, and switch. You can order



call WESTERN UNION operator 25

Your J&L stainless steel distributor can serve you better *because J&L serves him better,* backing him with the full facilities of J&L's Stainless and Strip Division.

Your J&L distributor can reduce your costs by providing a complete range of pre-production services, and doing it economically! He can save you the capital investment required to maintain long term inventories; he can help you eliminate the costs of overhead connected with stocking, accounting, and the inevitable losses incurred through waste and obsolescence due to specification changes.

Technical assistance in solving production problems is also available from your J&L distributor . . . when those problems are connected with an application using stainless steel, J&L's own staff of technical specialists will promptly answer your distributor's call for additional help.

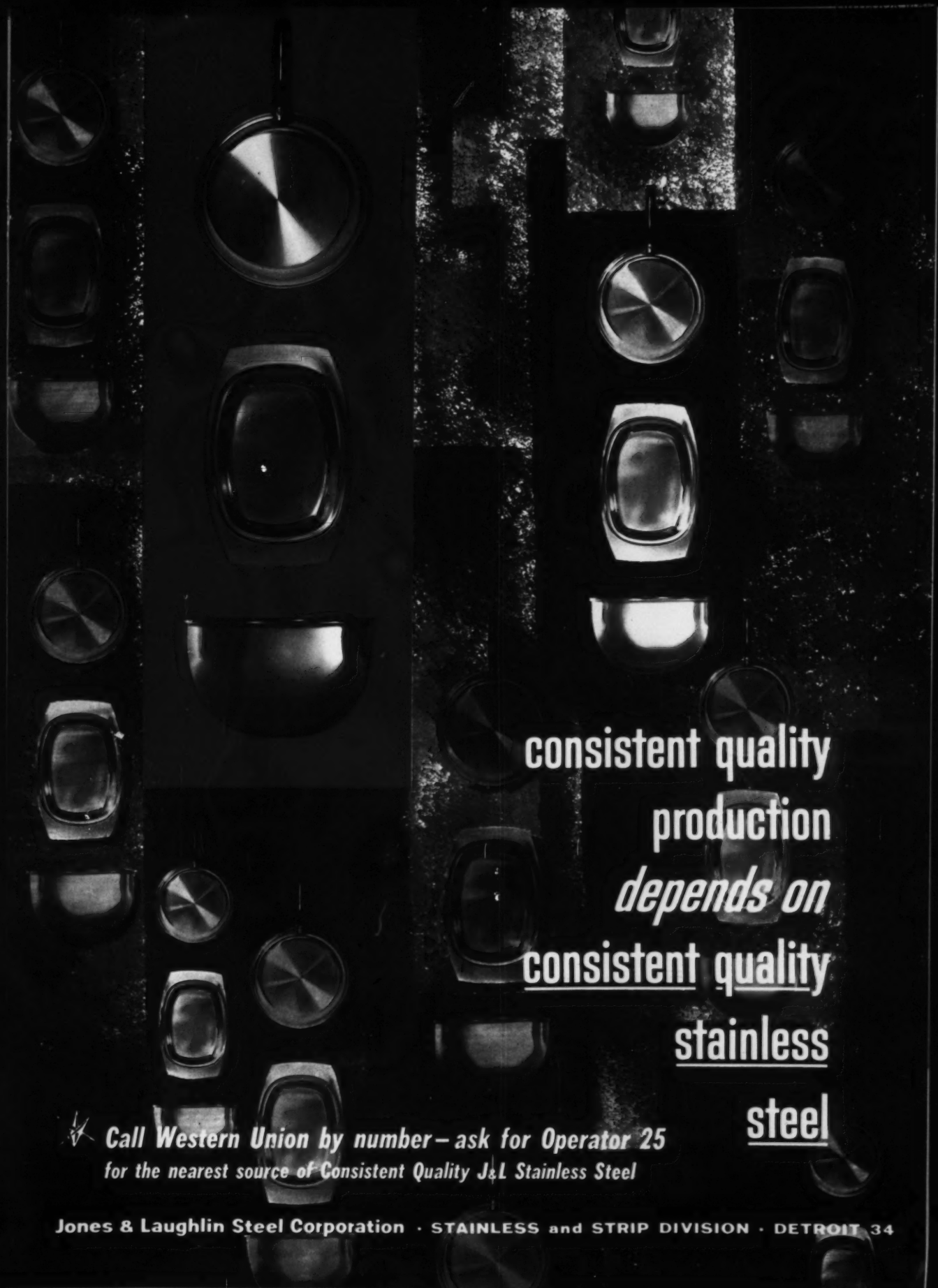
Even when advanced research is required you can call on your J&L distributor in confidence. He will be happy to discuss your problem because he knows he is backed by one of the world's most respected teams of metallurgists—J&L's own staff in laboratories at Detroit and the famous Graham Research Laboratories at Pittsburgh.

Your J&L distributor is as near as your telephone. Call Western Union Operator 25 for the name of your J&L distributor of Consistent Quality stainless steel.

J&L — a leading producer of stainless steel and precision cold rolled strip steels

STAINLESS

SHEET • STRIP • BAR • WIRE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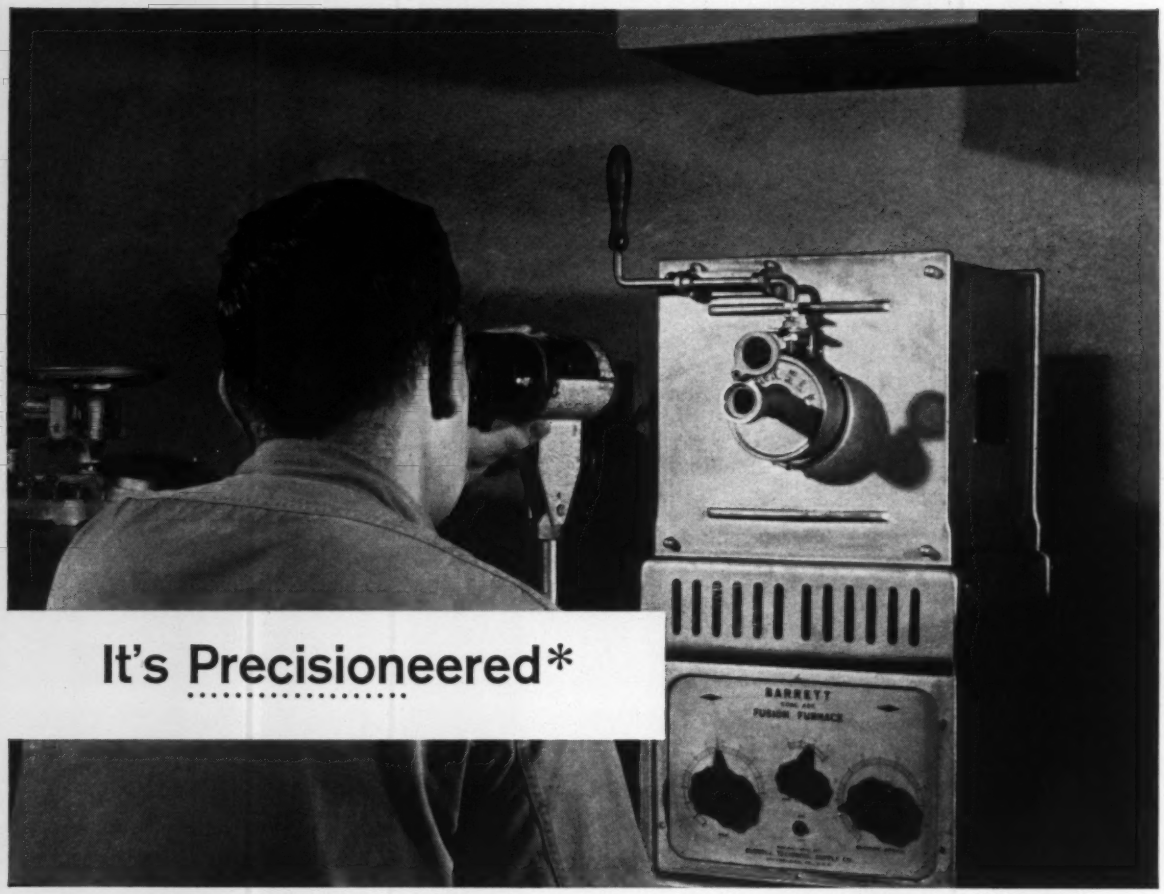
Why does Island Creek coal so often lower the cost per 1000 pounds of steam?...



It's Precisioneered*

An Island Creek technician uses the optical pyrometer to determine ash fusion point of a coal

* PRECISIONEERING at Island Creek is many things. Essentially, it is starting with superior seams of eastern coal . . . and preparing it to the exact specifications your burning equipment requires to produce steam at the lowest net cost per 1000 lbs. This involves the use of precision engineering techniques in the most modern preparation plants. It involves strictest laboratory controls. It involves far-reaching engineering service and evaluation studies. From start to finish it involves the career company attitude that has made Island Creek a leader to whom other leaders may look—with confidence. We'd welcome a chance to get down to net costs—with you and your plant people. Write. Or phone. No obligation, of course.

P.S. TO COKING COAL BUYERS
Island Creek Precisioneered Coking Coals can help increase hot iron production . . . lower net costs.

ISLAND CREEK
Precisioneered Coal

You can depend on Island Creek . . . a career company dedicated to coal

Island Creek Coal Sales Company, Chafin Building, Huntington 18, West Virginia • Chicago • Cincinnati • Cleveland • Detroit • Greensboro • New York • Pittsburgh

a water valve shut-off and an electric timer.

For further information, *write* General Offices, Metal & Thermit Corp., Rahway, N. J.

Power Unit Ups Electrical Discharge Machining Rate

ELECTRICAL discharge machining with the ER-300 roughing power supply can give you metal removal rates as high as 20 cu. in. per hour. That is about 20 times the rate of previous Elox power supplies and is standard for most types of tool steels. The rate can be adjusted down to 1 cu. in. per hour.

The unit has no moving parts. It's completely electronic. In addition to cavity and contour type parts, the equipment can be applied to rough machining through hole type die openings and to large deep holes such as in cruciforms.

For further information, *write* Elox Corp. of Michigan, 1830 Stephenson Highway, Troy, Mich.

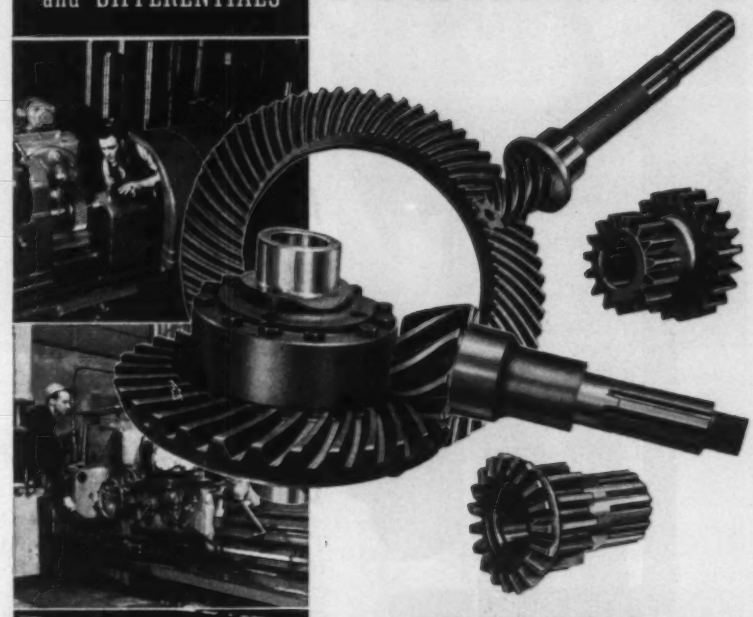
Power Press Feed Doesn't Mar Polished Metal Finish

WITH the Micro-Air 2 power press feed, polished metal can be fed to the die without marring the finish. The brake drag and stock guide acts only on the edges (1/4 in. in on each edge). The unit is air operated.

The leader pins are hardened and ground and carbide grippers are used for wear and accuracy. The gripper adjusts automatically to different stock thicknesses or variations. Gripping pressure increases

GEARS and DIFFERENTIALS

Your made to order by FAIRFIELD



Ask for interesting, illustrated bulletin.

A Plus Value IN ANY PRODUCT!

Simple arithmetic explains why, TODAY, many of America's leading machine makers no longer undertake to solve the problems involved in production of gears, differentials, and specially designed gear parts. For them, FAIRFIELD IS THE ANSWER!

Every facility is available at Fairfield—latest, cost-cutting, ultra-modern metal-working and heat treating equipment, kept busy by volume production, *plus* expert engineering counsel. This makes for economy and efficiency that can benefit YOU.

Check with Fairfield NOW on your gear production schedules. As one of the nation's largest independent producers, Fairfield can usually give you quickest service available and handle any production requirement. *Become a Fairfield customer; it pays!* CALL OR WRITE.

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Gears and Differentials Made to Order for:

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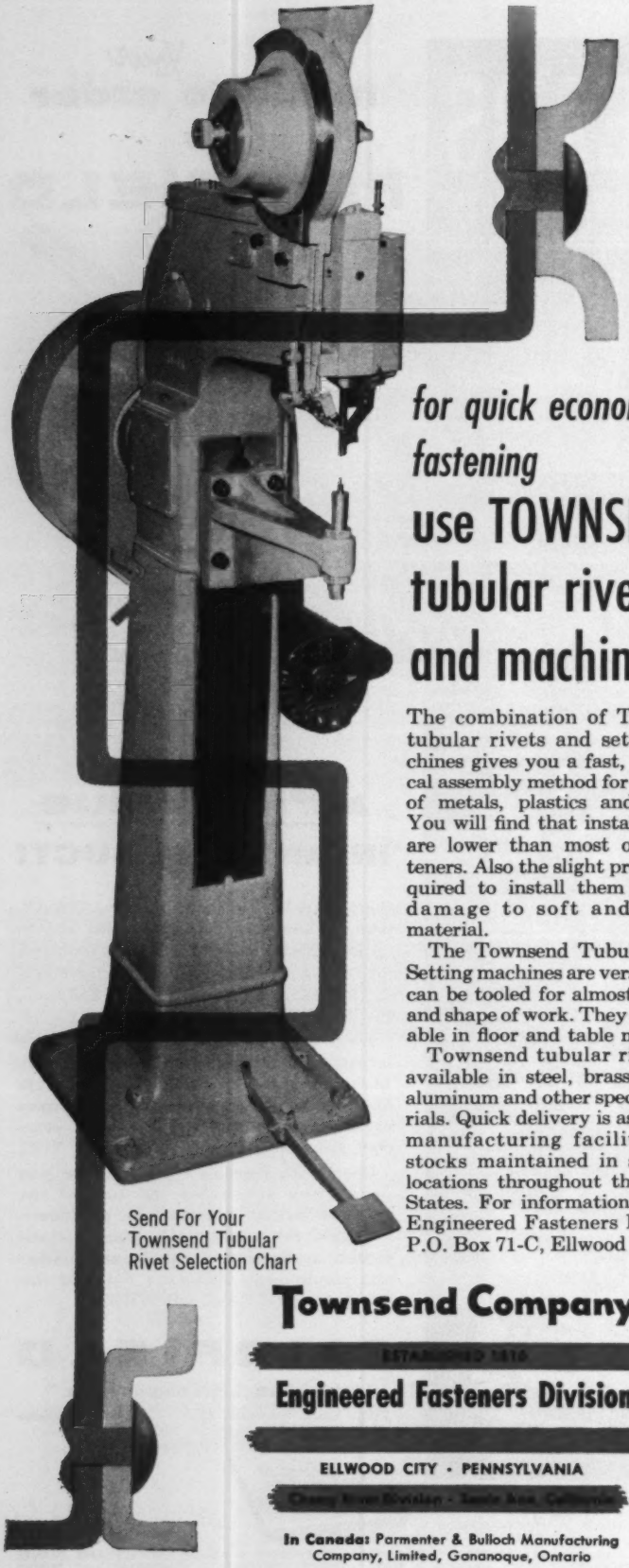

for quick economical fastening

use TOWNSEND tubular rivets and machines

The combination of Townsend tubular rivets and setting machines gives you a fast, economical assembly method for a variety of metals, plastics and fabrics. You will find that installed costs are lower than most other fasteners. Also the slight pressure required to install them prevents damage to soft and fragile material.

The Townsend Tubular Rivet Setting machines are versatile and can be tooled for almost any size and shape of work. They are available in floor and table models.

Townsend tubular rivets are available in steel, brass, copper, aluminum and other special materials. Quick delivery is assured by manufacturing facilities and stocks maintained in strategic locations throughout the United States. For information write to Engineered Fasteners Division, P.O. Box 71-C, Ellwood City, Pa.

Send For Your Townsend Tubular Rivet Selection Chart

Townsend Company

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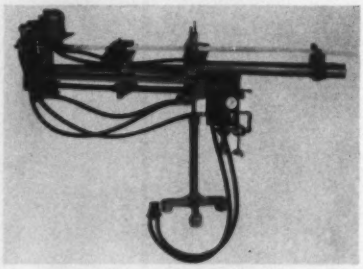
Engineered Fasteners Division

ELLWOOD CITY · PENNSYLVANIA

Chisholm Rivet Division · Santa Ana, California

In Canada: Parmenter & Bulloch Manufacturing Company, Limited, Gananoque, Ontario

NEW PRODUCTS and equipment



or decreases automatically in direct proportion to the load. The gripping rolls adjust laterally to nullify stock edge curvature effects. Maximum capacity of feed is 36 in.

For further information, *write* Nadel Tool & Mfg. Co. Inc., 20 Warren St., New York 7, N. Y.

Conveyor Belt Effective On 45 Degree Inclines

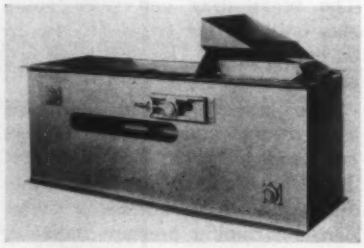
CARRYING objects up an incline as steep at 45 or 50 degrees is a simple job for the Dur-A-Lift conveyor belt. The top cover has parallel, transverse, V-ridges of wear resistant Dulon. The ridges are self-cleaning.

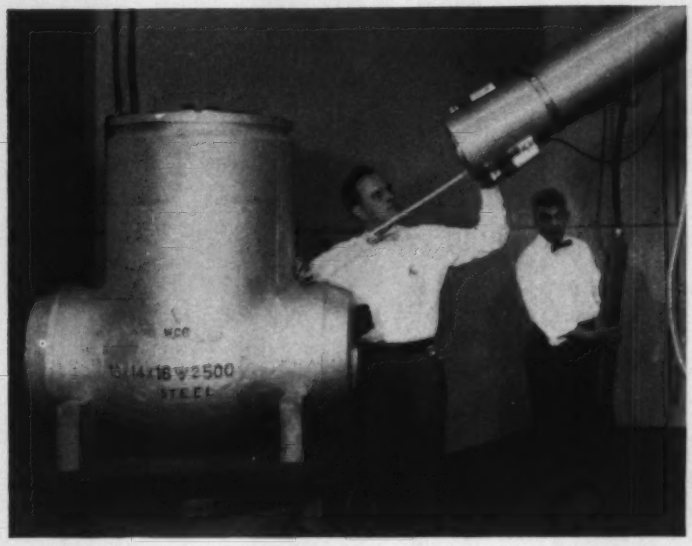
Ply stress is equalized in the design. The belt is available in three or four ply, 28 ounce duck. It's made in rolls 48 in. wide and 500 ft long.

For further information, *write* Boston Woven Hose & Rubber Co., a division of American Biltrite Rubber Co. Inc., 29 Hampshire, Cambridge, Mass.

Chip Separator Uses Permanent Magnets

FERROUS particles can be separated from nonferrous chips and other similar materials by the BNA mag-





The new 2-Mev X-ray generator and Kodak Industrial X-ray Film, Type AA, will help ACCO step up productivity by 9 times.

New 2-million-volt X-ray generator and Kodak Industrial X-ray Film give ACCO Steel Casting and R-P&C Valve Divisions of American Chain & Cable Company new inspection speed with fine radiographic quality.

Down goes inspection time— Up goes productivity

INDUSTRY TODAY is calling for more and more valves for higher pressures. These must be high-quality steel castings, and sound throughout.

To be sure of this quality, American Chain & Cable Company makes full use of radiography. And now with a 2-Mev generator and radioactive sources, together with Kodak Industrial X-ray Film, Type AA, inspection time has been greatly reduced and higher productivity facilitated.

Foundrymen everywhere—in large plants and small—find radiography a big factor in pleasing customers and building business. If you would like to know how it can help you, get in touch with an X-ray dealer or write us for a Kodak Technical Representative to call.

Read what Kodak Industrial X-ray Film, Type AA, does for you:

- Speeds up radiographic examinations.
- Has high film contrast, giving increased detail visibility and easy readability at all energy ranges.
- Provides excellent uniformity.
- Reduces the possibility of pressure desensitization under shop conditions.

EASTMAN KODAK COMPANY

X-ray Division Rochester 4, N. Y.

Kodak

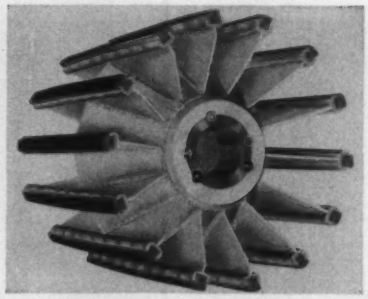
netic chip separator. The unit has a hopper, a vibrating feeder that carries material to a series of permanent magnets (arranged for alternate and opposite polarity), and an endless rubber belt that revolves around the magnets.

Separate discharge chutes are underneath for recovery of magnetic and nonmagnetic products. Capacities depend upon the material and the belt width. Capacity on brass chips is 2 tons per hour per foot of belt width.

For further information, *write* Dings Magnetic Separator Co., 4780 W. Electric Ave., Milwaukee 46, Wis.

Pulley Improves Belt Life, Doesn't Need Cleaning

MAXIMUM belt traction is provided by the rubber lagged Turn-Clean wing pulley. The exterior edge of each wing holds a rubber



bar. The high tensile strength rubber provides traction and automatically cleans itself by compressing on contact with the belt and springing back to normal height during rotation.

The bars also remove dried material from the underside of belts. The unit is advantageous in conveying systems that handle sticky materials that normally build up on belts and pulleys. The company says belt life can be increased and pulley cleaning shutdowns can be eliminated.

For further information, *write* Van Gorp Mfg. Inc., Box 123, Pella, Iowa.

Lift Truck Attachment Dumps Drop Bottom Boxes

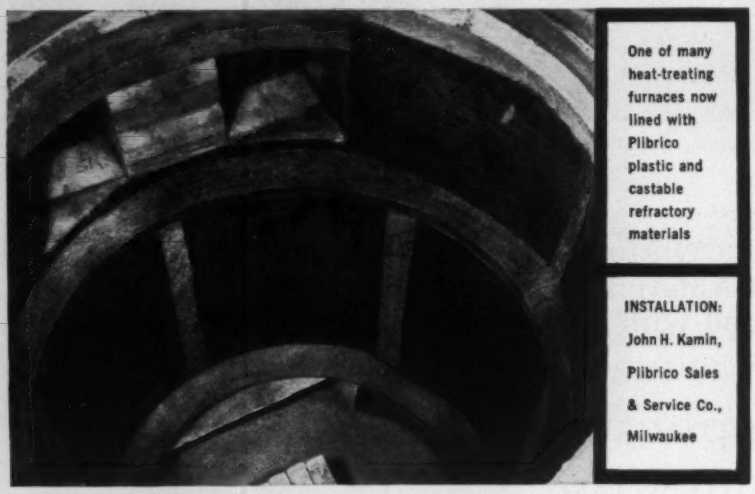
DROP bottom boxes can be dumped by lift truck operators with a Little Giant hydraulic lift truck attachment.

The attachment is a welded body with hardened guide bars and full floating cylinders. A simple bracket (welded to the top edge of existing boxes) engages the bracket on the dumper. The forks are not changed. The dumper fits any make and model lift truck and is furnished with hanger blocks to mount on any carriage. You can choose from 4000, 6000, 8000, or 10,000 lb capacity units.

For further information, *write* Little Giant Products Inc., 1530-50 N. Adams St., Peoria, Ill.

Epoxy Acrylic Coating Is Quick Drying Type

BAKING is not necessary with the epoxy acrylic called Ep-Ack. It's available in a wide range of colors up to a gloss of 95. Sunlight doesn't



One of many heat-treating furnaces now lined with Plibrico plastic and castable refractory materials

INSTALLATION: John H. Kamin, Plibrico Sales & Service Co., Milwaukee

...at Wisconsin Motor Corp., Milwaukee

Plibrico furnace lining replacement SAVES 49%...LASTS 2½x LONGER

Here are the facts:

	Former replacement lining	Plibrico's replacement lining
"Down time" during replacement	30 days	3 days
Installation cost	$1200	$650
Service life	1 year	2½ years

In brief: a $550 saving on installation . . . "down time" slashed tenfold . . . service life 2½ times as long.

One piece lining is the reason . . . Plibrico castable and plastic refractory materials do away with costly special shapes . . . it is free from joints which permit penetration of destructive thermal and chemical elements. If you are looking for a furnace lining that costs less and gives more service, call your local Plibrico man or . . .

WRITE FOR CATALOG 69 covering steel mill, industrial and foundry applications.

Plibrico REFRACTORIES

PLIBRICO CO., 1806 Kingsbury, Chicago 14 • Canadian Plant: New Toronto, Ont.

Plibrico Sales and Service Throughout the World

REFRACTORY PRODUCTS • ENGINEERING • CONSTRUCTION

AGAIN-

Shown here is the 6" Rapidaytor Dolphin Submersible Pump, one of a complete line of 4" and 6" pumps made by THE TAIT MANUFACTURING COMPANY, Dayton, Ohio. Arrow points to the upper body shell made of Revere seamless leaded brass tubing. Hand holds the diffuser casing made of Revere Brass Strip and used inside pump.

Revere helps "fit the metal to the job"

AND A PUMP MANUFACTURER FABRICATES SUPERIOR PARTS WITH GREATER EASE . . . INCREASES TOOL LIFE

An important part of the submersible pumps made by Tait Manufacturing Company is the brass diffuser casing you see above. This part had formerly been made of ferrous metal. While satisfactory as a pump part it was difficult to work and draw . . . at the same time tool life was short.

One of Revere's Technical Advisors was asked to study the problem. Revere Cartridge Brass Strip of a certain temper was recommended, samples submitted, and, after extensive tests, was approved. The customer has found that not only does the diffuser casing, made of Revere Brass, perform well in the pump, but it also has superior drawing properties, is more easily worked, and tool life has been substantially increased.

This meticulous attention to "fitting the metal to the job" also resulted in Tait Manufacturing Company's specifying Revere seamless leaded brass tubing for the upper body shell of its submersible pumps. Here the application called for extremely close straightness and roundness control which meant special attention to detail on the part of the Revere mills.

Why not put the extensive knowledge of Revere's T.A. Service to work for you? With the wide variety of metals at your disposal, perhaps Revere can help you select the one best suited for the job, with a resultant saving of money while improving product quality.

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Executive Offices; 230 Park Avenue, New York 17, N. Y.

Mills: Rome, N. Y.; Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles, Riverside and Santa Ana, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Fort Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

discolor it and it is resistant to salt, fog, humidity, acids and alkalies, scarring, marring and shatter.

The company says the material can air dry in minutes. It contains a new plasticizer that provides excellent flexibility.

For further information, *write* Technical Service Dept., Industrial Finishes Co., 1119 Land Title Bldg., Broad & Chestnut Streets, Philadelphia 10, Pa.

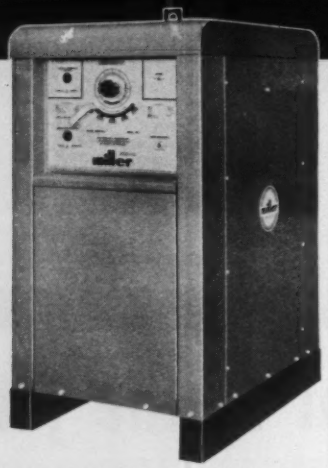
Airless Spray Gun Recirculates Paint

CONTINUOUS recirculation is maintained in the GunJet spray gun during use and shutoff periods. It's built with a high volume inlet and outlet that can handle recirculation of liquids containing suspended solids or others that must be kept at an elevated temperature.

The unit has a tungsten carbide valve seat and needle, stainless steel body and cap, and Teflon packings. The inlet body is independent of the valve trigger mechanism. Liquids contact only the body, valve needle, valve seat, and orifice tip. The trigger control mechanism is not contaminated by liquids.

For further information, *write* Spraying Systems Co., 3201 Randolph St., Bellwood, Ill.

NEW BALANCED WAVE TIG WELDER DELIVERS DEEP, CLEAN "X-RAY" WELDS ON SHEET METAL or PLATE



miller WELDERS

• A bold new concept in electrical design and circuitry is introduced in the all-new Miller BWC-300MAP. One of several notable results is complete and automatic elimination of the d-c component at all welding currents . . . an essential in certain critical welding applications.

• Due to the specially designed transformer, high arc initiation voltage and unique circuit, arc-outages cannot occur.

• "Fail-safe" voltage reducer automatically lowers the high arc initiation voltage to a low open circuit voltage — even in case of malfunction of the reducer.

• Five independent welding ranges with overlap offer an infinite number of positive, fine current settings — another characteristic of Miller's electrical control that speeds up and simplifies critical welding jobs.

EXCLUSIVES! — found only in new Miller BWC-300MAP:

1. Perfect balance throughout the entire welding range EVEN DURING CRATER ELIMINATION.
2. Arc stability WITHOUT HIGH FREQUENCY at as low as 18 amperes.

The outstanding versatility of this welder, and the specifics on its various features, are detailed fully on our form #BW-3 — a copy of which will be sent to you promptly upon request.

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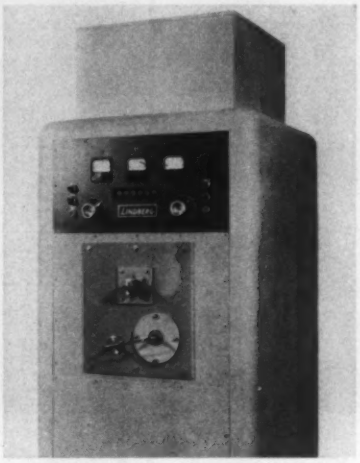
Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

Induction Heating Unit Is Dual Frequency Type

A 10 KW OUTPUT induction heating unit (Model LI-10D-1) developed by Lindberg Engineering Co. operates at about 400 kc and 4 mc. Power input is 230 or 460 volts, three phase, 60 cycles. Power consumption is 20 kva maximum at 90 per cent power factor.



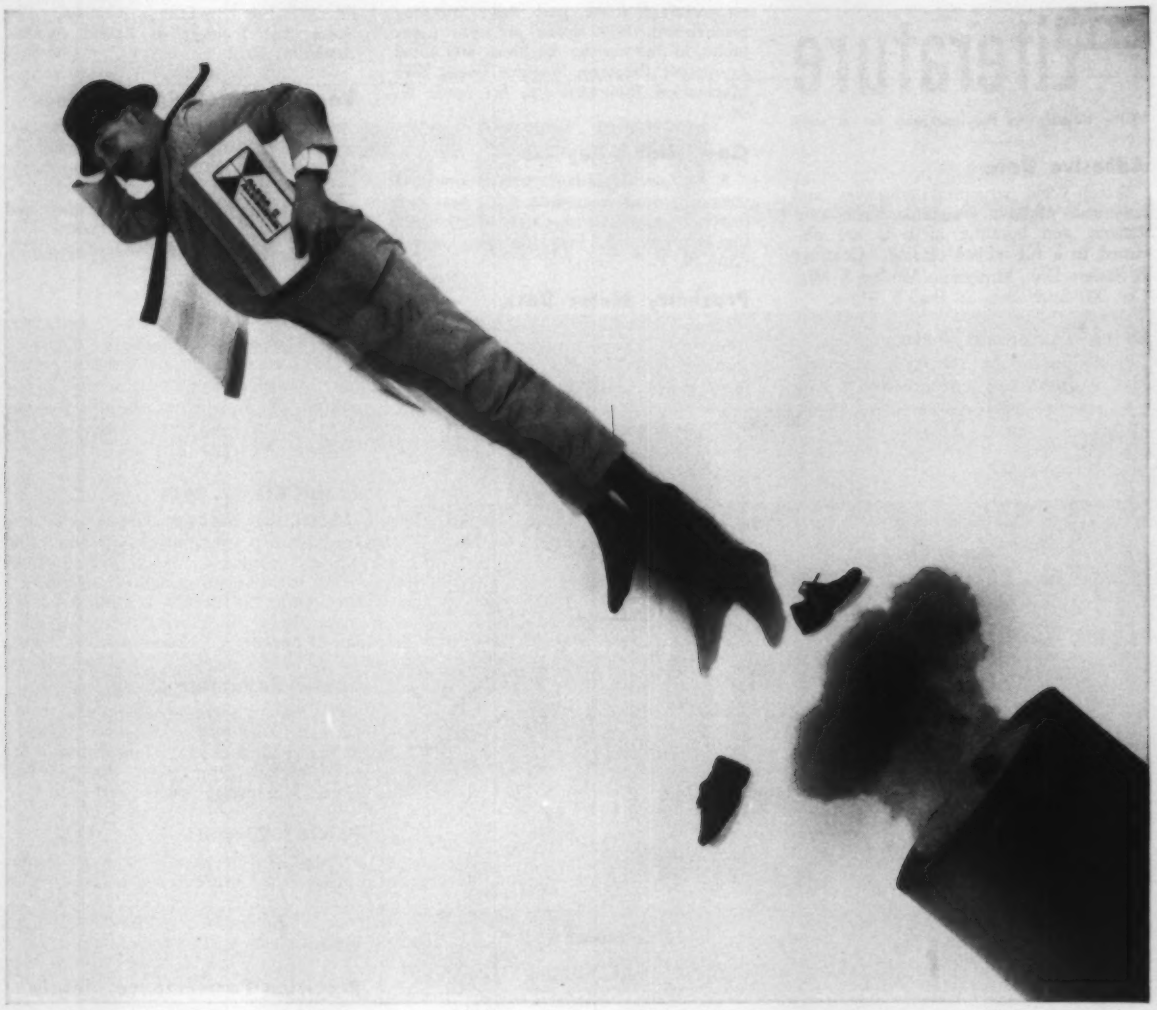
Power for the water cooled oscillator tube (Type 6420) is obtained from six industrial 575-A mercury vapor rectifier tubes.

For further information, *write* Lindberg Engineering Co., 2450 W. Hubbard St., Chicago 12, Ill.

Strapping Unit Is Compact

A PNEUMATIC machine introduced by United States Steel tensions, ties, and cuts round steel strapping in a 3 second operation. The unit weighs less than 20 lb. After threading the machine and draping the package, the operator completes the job by turning a single control.

For further information, *write* United States Steel Corp., 120 Montgomery St., San Francisco 6, Calif.



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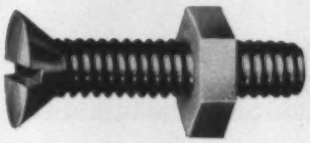
Not *that* fast. But very fast—because there's a local distributor in your Yellow Pages, with full stocks of Alcoa® Aluminum Fasteners. It doesn't matter what you need . . . rivets, nuts, bolts, machine screws, wood screws, sheet metal screws, washers, anything in standard types and sizes. Just call your Alcoa distributor for quick service.

Not only quick service. This distributor offers a good many other advantages, too, when you order Alcoa Aluminum Fasteners from him. The largest line of aluminum fasteners. The highest quality . . . meaning full threads; no burrs; fully heat-treated, high-strength alloys; corrosion resistance. *And* full count—exactly what you order, no misfits, no rejects, no "seconds"—means lower production costs for you.

So . . . all in all, when you consider the time and money you'll save, and the beautiful appearance of your finished product, and the lasting satisfaction . . . you ought to call your Alcoa distributor now. (Want more data, and samples? Mail the coupon!)



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NEW literature

Write directly to the company for a copy

Adhesive Data

Scotch-Weld structural adhesives and structural adhesive design concepts, joint designs, and bonding methods are discussed in a file-tabbed catalog. Coatings & Sealers Div., Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.

Drive Equipment Data

A 40 page catalog, No. 160, gives load ratings, dimensions, and installation data on standard roller gear drive indexing mechanisms, high speed precision index tables, in-line transfer machines, and allied equipment. Ferguson Machine Corp., 7818 Maplewood Industrial Ct., St. Louis 17, Mo.

Cast High Alloy List

A list gives standard designations and chemical composition ranges for heat and corrosion resistant cast alloys. Alloy Casting Institute, 1001 Franklin Ave., Garden City, N. Y.

Proximity Meter Data

Manual TM-951-2 gives circuit and dimensional information and application specifics on a capacitance operated proximity meter. Aeronautical & Instrument Div., Robertshaw-Fulton Controls Co., Santa Ana Freeway at Euclid Avenue, Anaheim, Calif.

Vacuum Metallizing Coatings

A 45 page booklet describes the application and use of vacuum metallizing coatings which may be applied by spraying, dipping, and flow coating to thermoplastics, thermosetting plastics, metals, and glass. Logo Div., Bee Chemical Co., 2933 S. Stony Island Ave., Chicago 33, Ill.

Graphite Data

An 8 page booklet explains the three types of graphite and outlines the principal properties, characteristics, and applications of amorphous crypto-crystalline graphite. United States Graphite Co., Saginaw, Mich.

Free-Cutting Rods

A 20 page booklet contains rod and bar tolerances, weights, specifications for Nittany free-cutting brass, leaded naval brass, leaded manganese bronze, free-cutting commercial bronze, and leaded nickel silver alloys. Customer Service Div., Titan Metal Mfg. Co., Bellefonte, Pa.

Speed Reduction

Methods of speed reduction with compact, shaft mounted units in a wide range of sizes and horsepowers are described in a 64 page bulletin, A692. Dodge Mfg. Corp., Mishawaka, Ind.

Printed Circuits

A bulletin discusses benefits of printed circuits, types of insulating materials, and current capacity in relation to width of copper conductive patterns. Whitney Blake Co., New Haven 14, Conn.

Precision Performance Metals

A 24 page brochure covers the end uses of small diameter tubing and precious metal products. Platinum Works, J. Bishop & Co., Malvern, Pa.

Swageable Thermocouple Tubing

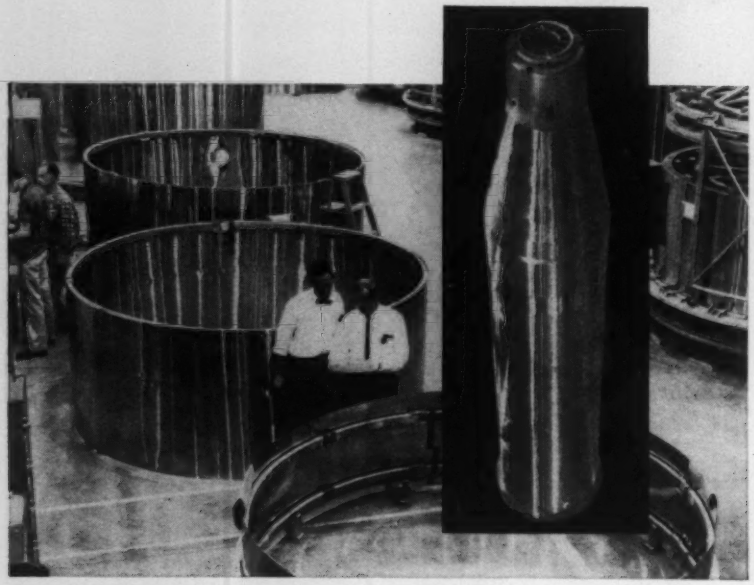
A bulletin describes high temperature, swageable, thermocouple tubing and discusses chemical analysis, standard sizes, and tolerances of single and multibore tubing. Saxonburg Ceramics Inc., Saxonburg, Pa.

Impact Extrusion

"Alcoa Impacts—Metal in Motion" provides information on developments in the impact process, and outlines size ranges, impact containers, and the Alclad impact. Aluminum Co. of America, 724 Alcoa Bldg., Pittsburgh 19, Pa.

Soaking Pit Systems

A 12 page brochure, Bulletin MSA-177, ranges in subject matter from a description of the soaking pit operation to schematic drawings of several control system installations. The transition from hydraulic to pneumatic to electronic controls is outlined. Controls Div., Hagan Chemicals & Controls Inc., Hagan Center, Pittsburgh 30, Pa.



"the life of an ATLAS tank section begins in the town of Washington, Pa.

. . . where the Washington Steel Corporation produces thin-gauge Stainless Steel in long, flexible bands about a yard wide."*

Washington Steel Corporation is the exclusive supplier of stainless skin for the ATLAS program for a very good reason: it has been able to meet the exacting specifications laid down for this specific undertaking.

Washington Steel Corporation is the pioneer in precision-rolling of light gauge stainless sheets by the Sendzimir process.

*ATLAS—The Story of a Missile
by John L. Chapman, ©1960

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46" x 90" SLABBING MILL

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio; Stedman Foundry and Machine Co., Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

PRECISE GAUGE CONTROL

to your restricted specifications with

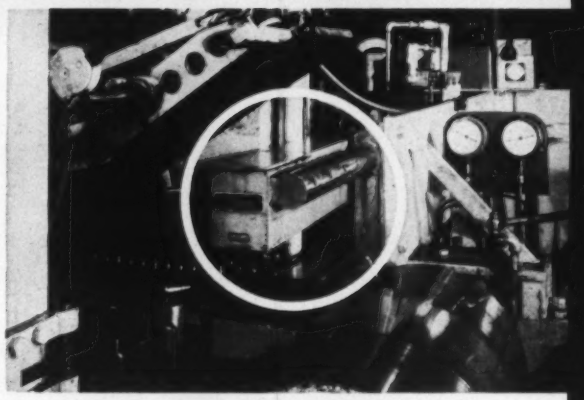
J&L Cold Rolled Strip Steels

In many critical applications, precise gauge control yields worthwhile savings on production costs. Not only does it mean increased tool life but it eliminates grinding for gauge accuracy and reduces quality control costs by minimizing inspection schedules.

At J&L, specially designed cold mills make it possible to exercise precise gauge control — to your specifications. J&L processing techniques include the use of AccuRay gauges to provide exact measurements during rolling. Gauge accuracy is just one of the many restricted specifications which can be met consistently by J&L.

J&L offers you an experienced organization devoted to strip steel processing combined with fully integrated production facilities.

For your convenience, precision strip facilities are available to you in our plants at Youngstown, Indianapolis, Los Angeles and Kenilworth (N. J.)



Typical of J&L precise control is this AccuRay thickness gauge to help assure tolerances on cold rolled strip steels.

STRIP

LOW CARBON • HIGH CARBON • ALLOY • STAINLESS
TEMPERED SPRING STEEL • ZINC AND COPPER COATED

Jones & Laughlin Steel Corporation • STAINLESS and STRIP DIVISION • Youngstown 1, Ohio

Seasonal Factors Begin to Appear

LOOK for demand from the two biggest users of steel—automobiles and construction—to pick up. There has been no flood of new orders for steel, but the way has been cleared for reduction of dealer inventories (1 million unsold cars) and consumption of the big tonnages that have been shipped since the first of the year.

Together, the automotive and construction industries accounted for more than one-third of the finished steel shipped last year by American mills. They'll take as large a percentage of this year's shipments. That's why steelmakers are watching sales figures so closely. They're optimistic because:

- Car dealers sold 159,000 American built cars in the Mar. 11-20 period, or 19,975 in each of the eight selling days. That was 15 per cent more than they averaged per day in the first third of March and 11 per cent better than they did in the corresponding period of February.
- Structural fabricators booked 30 per cent more business in February than in January. On Feb. 29, they had a backlog of 2,189,234 tons. They expect Mar. 1 to June 30 shipments of 1,269,360 tons, so they'll average 317,000 tons a month (vs. 303,000 in the corresponding months of 1959).
- Engineering contract awards jumped 5 per cent in February. Highway awards were 9 per cent greater than in February, 1959.

SERVICE CENTERS REBUILD—Within a week, steel service centers will bring their inventories up to a target they didn't expect to reach until mid-year: 3.5 million tons. Last December, their stocks were at a poststrike low of 825,000 tons. One reason for the fast buildup: Steelmakers have increased their output of the products that service centers buy (plates, structural shapes, bars, sheets, tubular specialties) from 68 per cent of over-all production to 72 or 74 per cent. They've done it because demand for other items—semifinished steel, oil country goods, and merchant products—has been comparatively weak. And service centers have been taking 17 or 18 per cent of the mills' shipments. They're well stocked on all products except a few alloy items—cold finished bars, cold rolled sheets, and galvanized sheets. The shortages are being felt only in a few areas.

IMPORTS STILL HURT—Although imports of steel mill products were lower in January than in December (465,050 tons vs. 539,084 tons), they were more than double January, 1959, figures (229,425 tons). To combat foreign competition, Atlantic Steel Co., Atlanta, has reduced prices of common nails by as much as 15 per cent. The firm's nailmaking machines are reportedly operating on a single turn, with production at less than 25 per cent of capacity. California producers of baling wire and welded mesh have cut their prices 5 to 7 per cent because of Japanese competition. Imported pipe in the small sizes (up to 4 in.) is being landed at all major ports of entry, at prices that are 20 to 25 per cent below domestic quotations.

BUY AMERICAN—However, the overseas trade is not a one way deal. It was reported from Detroit last week that a major British automotive supplier is coming to the U. S. for tubing and cold rolled sheets. It can't get satisfactory delivery on tubing and can't get the drawing quality it needs in sheets from foreign producers.

INGOT RATE SLIPS—Last week, steelmaking operations dropped 2.4 points to 88.7 per cent of capacity. Production was about 2,527,000 ingot tons. Production will probably edge down a little more this week. STEEL's price composite on the premium grade of heavy melting scrap dropped 67 cents to $33.33 a ton, matching last year's lowest quotation.

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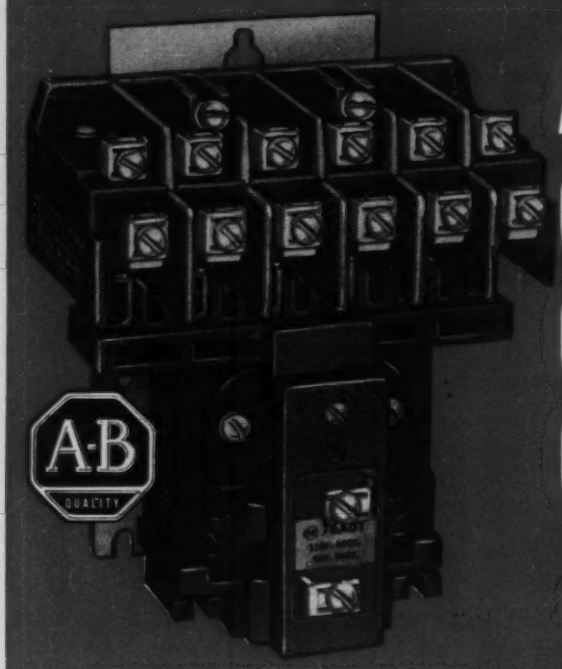
*Current prices were published in the Mar. 28 issue and will appear in subsequent issues.

IT'S NEW



Bulletin 700 Type BR Relay with all six of the convertible poles arranged for normally open contact operation.

Allen-Bradley Convertible Contact CONTROL RELAY

BULLETIN 700

TYPE BR

Changeover made in seconds!

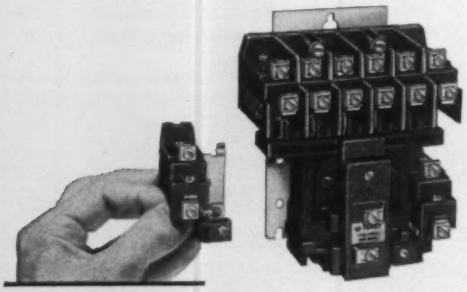
The contacts of the new Type BR relay can be arranged for either normally open or normally closed operation—and any changeover in the field can be made in seconds. A screwdriver is all that's needed.

This new A-B Bulletin 700 Type BR relay is ideal for use on automatic machines where control functions are frequently altered to meet production changes.

Quick convertibility of the contacts enables easy "on-the-spot" changes—from "normally open" to "normally closed"—or vice versa.

These new Bulletin 700 Type BR relays have been exhaustively tested to make sure that they will provide the many millions of trouble free operations for which all A-B controls are famous. In fact, the Bulletin 700 Type BR relays will establish new standards for long relay life and "reliability" of contact operation. Of course, they have double break, silver contacts that never need attention; also, the cast-plastic coil is impervious to the most severe atmospheric conditions.

Please write for full details, today!



Two extra convertible poles can be easily added—in the field

An auxiliary convertible contact pole—having full switching capacity—can be easily added to the left and right sides of the Type BR relays. These auxiliary poles are front-mounted and can be added without disturbing the wiring of the relay—and without removing the relay. All relays are designed to also accept stab connectors, and—all terminals are accessible from the front.

Allen-Bradley Co., 1320 S. Second St., Milwaukee 4, Wis. In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY Member of NEMA

QUALITY MOTOR CONTROL

STEEL
QUARTERLY SURVEY

COMPONENTS	CURRENT INVENTORIES					2nd Quarter FORECAST		
	UNDER 10 DAYS	10-30 DAYS	30-60 DAYS	60-90 DAYS	3-6 MONTHS	LOWER	SAME	HIGHER
CASTINGS . . . . . Die, grey iron, malleable, nonferrous, steel.	2%	22%	53%	21%	2%	27%	62%	11%
OTHER FORMED COMPONENTS . . . . Forgings, stampings, springs, wire shapes.	3%	15%	42%	29%	11%	24%	64%	12%
MACHINED COMPONENTS . . . . . Bearings, couplings, cylinders, gears, screw machine products.	3%	19%	41%	27%	10%	25%	64%	11%
ELECTRICAL EQUIPMENT, MOTORS . .	9%	28%	35%	23%	5%	26%	64%	10%
FASTENERS	1%	21%	47%	16%	15%	17%	71%	12%
MECHANICAL RUBBER GOODS, BELTING	7%	24%	45%	24%	—	18%	75%	7%

FIGURES are percentages of respondents to STEEL's quarterly survey.
COLOR UNDERSCORED figures show how most respondents reported.

Component Buyers Put On the Brakes

Launching problems of the Soaring Sixties and rising inventory costs are prompting purchasing agents to chop excess reserves. Overstocks cited by 20 per cent

HEAVY INVENTORY purchases by component users have gone with the winter snows. Although some companies are still chilled by a few imbalances, it appears buying will return to normal between now and midyear.

In the meantime, a general stock reduction is underway. Over 24 per cent of the respondents to STEEL's quarterly survey of component buyers plan to reduce reserves by July. Only 11 per cent expect a continued buildup. Reasons: Business is good, but it's not as good as originally anticipated. Rising inventory costs have prompted many firms to maintain tighter inventory control.

• **Overstocks Cited**—Overstock problems are the highest in quite some time. More than 20 per cent of the purchasing agents polled report excesses in one or more categories. Castings are the most abundant with electrical goods and gears frequently noted.

Although 35 per cent of STEEL's respondents noted delivery problems on some items, that's a 12 per cent drop from the number of complaints registered in January (see STEEL, Jan. 4, p. 381). Most of the difficulty appears to be in bearings and electrical equipment. Die and malleable castings and gears were also mentioned by many buyers.

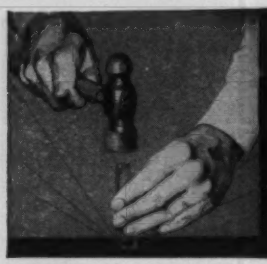
The success of inventory buildups for the steel strike and the sixties has become more apparent with each survey since last fall. Even at this late date, 37 per cent of the respondents reveal stocks are higher than they expected them to be at this time. Only 5 per cent state they're lower. Thus the cutbacks, despite the prospects for a good second quarter.

• **Not Much Change**—Except for the filling of a number of inventory holes, the over-all picture is not much different from that on Jan. 1. Reserves have settled in the 30 to 60 day category. A slight increase in 60 to 90 day levels of machined and formed components is attributed chiefly to the cutbacks in auto production. Stocks of rubber goods continue to shorten as the strike stored surplus is reduced. The other product groups experienced mainly a leveling out in all categories.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 188 & 189

Flat rolled steel demand is subsiding, but producers expect near capacity operations through May. Automakers are adjusting their orders to revised production sched-



Specify PANNIER STEEL STAMPS for a longer life of CLEANCUT MARKING

29,335 hammer blows—and still marking cleanly—Pannier Letter and Number Stamps

Rounded corners for finger comfort
Rounded head distributes impact, reduces mushrooming.
Type size Identification
Added metal in Pannier fillet increases durability. Correct bevel gives clearer impression, longer life. Outside bevel longer than inside for protection of character face.

Made of the finest tool steel and correctly heat treated for best combination of hardness and toughness, Pannier single character stamps can take it! Scientific shaping and accurate engraving insure a long life of good, clear impressions. Available in letters, figures and special symbols, and in light, medium or heavy duty design.

Extra tough steel forging stamps for hot or cold, heavy duty marking

For stamping names, part or patent numbers, trade marks and similar markings, Pannier forging stamps are made in four styles:—Hand-style, fullered for wire handle and wood handle style with eye parallel or perpendicular to lettering. All are designed and heat treated for clear impressions and long service. All are covered by the Pannier Master Marker guarantee.

Supreme Holders with "Roto-Pin" for quick, easy number change

An easy, half-turn flip for Roto-Pin releases any or all of the steel type for fast change. A reverse flip locks them in perfect alignment.

Roto-Pin makes this Pannier Master Marker a time saver in number change and makes serial number marking fast and efficient. The hardened anvil at the base of the type slot keeps type in perfect alignment for equal impression. Machined from bar tool stock, the Supreme Holder has a heat treated striking head. Both anvil and striking head are replaceable for longer life of the holder itself. Made in hand or wood handle styles, for hot or cold marking.

Write for literature

BIRTHMARKED MATERIALS

MARKING DEVICES

THE PANNIER CORPORATION

220 PANNIER BUILDING PITTSBURGH 12, PA.

Offices: Los Angeles • Cleveland • Chicago • Philadelphia • Birmingham

PANNIER MASTER MARKERS FOR QUALITY

ules. Much tonnage has been set back to June. The carmakers bought less steel for April than for March, and barring a surge in retail auto sales, they'll take less in May than in April. It's believed they have enough steel in stock and on order to complete their 1960 model runs and make a start on next year's cars.

Sheet producers say the tempo of setbacks and cancellations isn't increasing. Most April orders are of a fill-in nature. Almost all suppliers can take additional tonnage for April, particularly in hot rolled. Cancellations and setbacks by the automakers have made limited quantities of cold rolled available for prompt delivery to other users.

Appliance demand has dropped from the peak poststrike level, but it's still good, a leading sheet producer reports. Road machinery and earth moving machinery business is spotty.

There has been little easing in demand for galvanized sheets. Producers expect near capacity operations all year. Record output of about 3.5 million tons is predicted for this year.

In May and June, Inland Steel Co. will be filling an export order for cold rolled to France. Such trade is not new to Inland, but it does not export when domestic demand is strong.

Shipments of galvanized sheets declined only 2 per cent last year—2,828,845 net tons vs. 2,772,835 in 1958—despite the 116 day steel strike, reports the Committee on Galvanized Steel Sheet Research. Shipments to the freight car construction industry were up almost 115 per cent, for automotive classifications almost 20 per cent. Automotive use has shown an increase of 700 per cent in pounds used per car since 1954. Highway construction use also has increased sharply. Based on current producing capacity and new facilities to be added this year, galvanized steel shipments in 1960 should rise to a record of around 3.5 million tons.

Steel Bars . . .

Bar Prices, Page 187

Demand for hot rolled carbon bars is spotty. But most producers are booked up through April and they anticipate fair volume during May. Buying is limited to current

needs, because consumers see little point in adding to inventories. Most mills are back on normal rolling schedules. Customers can usually find a mill that's rolling a desired size; consequently, ordering is on a current basis.

Alloy bars are in easy demand, reflecting a continued lag in automotive specifications.

It's estimated that first quarter (1960) bar shipments were almost 25 per cent heavier than they were in the same quarter last year.

Some cold finishers will operate at a slower pace in the second quarter than they did in the first three months. The situation is reflected in smaller hot bar requirements by the cold mills.

Steel Imports in January Double Those a Year Ago

Imports of iron and steel products in January were double those in the like month a year ago, totaling 516,542 net tons (valued at $73,360,808) vs. 257,999 tons (valued at $31,722,615). At the same time, exports continued to fall, the January total of 190,337 tons (valued at $45,817,835 comparing with 220,978 tons (valued at $51,100,682) in January last year.

Pig iron imports (included in the above total) during January amounted to 14,740 tons, while exports in the month were only 2312 tons. Imports of iron ore in the month totaled 2,654,878 tons, while exports were only 78,860 tons. Imports of iron and steel scrap in the month were 12,025 tons compared with exports of 356,020 tons in the period.

Tin Plate . . .

Tin Plate Prices, Page 189

Tin plate business is maintaining good volume. Demand is expected to be strong through the first half of the year, possibly through the third quarter. A big push is now being made to use the material for packaging soft drinks in tin cans.

Wire . . .

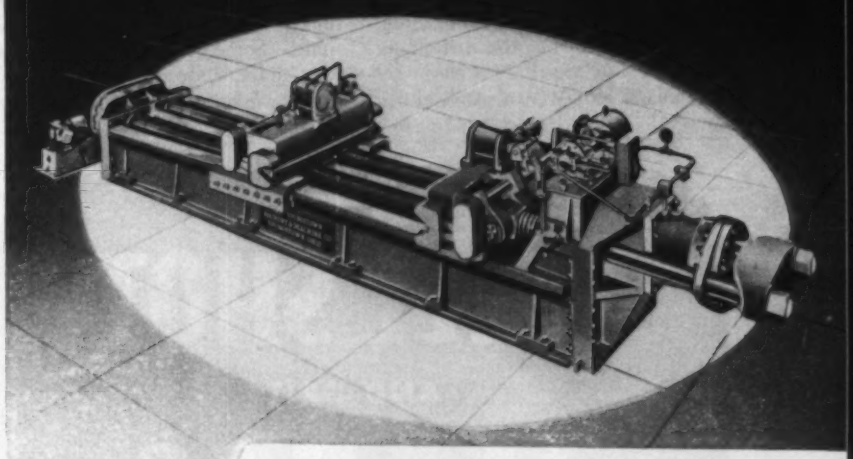
Wire Prices, Pages 189 & 190

Wire consumers' stocks are heavier and in better balance. The situation is being reflected in slackening wire mill operations at some

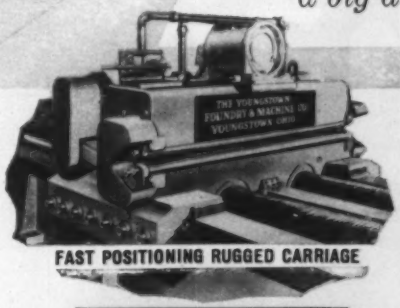
"YOUNGSTOWN"

New Carriage-Type Design

STRETCHER LEVELER



a small difference in design makes a big difference in RESULTS...



FAST POSITIONING RUGGED CARRIAGE

WEDGE TYPE HEADS with WAFFLE TYPE GRIPPER JAWS assure flatness of sheet-ends.

Rugged Three Way fabricated Steel Bed insures utmost rigidity.

- CONSERVES VALUABLE FLOOR SPACE
- SPEEDS STRETCHING OPERATION
- AIDS QUALITY CONTROL

The Hydraulic Stretcher Leveler pictured is 800,000# Capacity capable of stretcher leveling mild cold rolled sheets 30" to 62" wide, 30" to 168" long, up to .180" thick in either single or multiple sheets.

A complete range of sizes . . . built from 10,000# for aluminum extrusions to 2,000,000# for stretching plate. New performance throughout a long life of service is assured by traditional "YF&M" rugged construction. Write for Complete Information.

The Youngstown Foundry & Machine Company

Serving Industry Since 1885

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33

points, notably at works producing specialties.

Manufacturers' wire is moving at a slower pace, but construction requirements are increasing seasonally, resulting in a heavier movement of strand for prestressed concrete structures. A prestressed concrete railroad tie is being tested over a quarter mile stretch of the Seaboard Air Line Railroad near Tampa, Fla.

The weather has been holding down sales of merchant wire in recent weeks. However, a seasonal upturn of fairly sizable proportions is believed in the making. Farm requirements are bound to increase, and construction needs will grow.

Colorado Fuel & Iron Corp. is low bidder on 29.69 miles of fencing for state highways in Nassau and Suffolk Counties, New York. It bid $190,543.

Imports continue to cut into domestic sales of merchant wire and nails. Some producers in the East can make deliveries within two to three weeks, with schedules running contrary to the usual uptrend at this season. Makers are in better position on merchant wire, although they can't ship in less than a month on various grades.

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AND GRIT

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- "SUPER-STEEL" is high quality steel shot and grit, made at lower cost by a *revolutionary new process.*
- "SUPER-STEEL" *savings* passed along to steel plants.
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Plates . . .

Plate Prices, Page 187

Some platemakers report a slight increase in demand, affecting both carbon plates and specialties. Other makers, however, see little change in the market situation. More buying will be necessary to sustain mill operations. Indications are mill operations will be down a little in April from the March level, and further easing is likely in May.

Orders for second quarter are developing slowly. New tonnage can still be placed for April shipment. Slow demand, in part, is attributed to reduced requirements of tankmakers and warehouses.

Except for direct buying by the Navy, shipbuilding demand has slackened. Several Naval vessels, including a cruiser, have been moved from the struck Bethlehem Quincy yards to Boston Naval Shipyard for completion and repairs.

Distributors . . .

Prices, Page 192

Steel service centers had their best volume of the year in March. On a day to day basis, there was little change from February business, but the greater number of working days boosted the total tonnage. February was about comparable to January in over-all volume. April is likely to prove as good a month as March.

Service center inventories are in good balance, except for cold rolled and galvanized sheet stocks, and they are improving.

Brokers handling imported steel, particularly in the Southwest, are liquidating stocks at distress prices. The development is hurting domestic steel sales by the service centers.

Pig Iron . . .

Pig Iron Prices, Page 192

The buying pace in the merchant pig iron market continues slow. Foundries are experiencing a letdown in orders for castings, and, as a result, are careful in placing new iron orders. Some casting shops are

trying to work off iron inventories which they consider excessive.

Fair demand for iron is expected in the second quarter. With many casting shops operating on a four day week it's not likely that buying will be noticeably brisk. Much depends on the ability of the automakers to maintain production schedules.

Blast furnace production (pig iron and ferroalloys) in February totaled 7,414,002 net tons, reports the American Iron & Steel Institute. It compares with 7,830,097 tons in January. Of the month's total, 71,533 tons were ferromanganese and spiegeleisen, the rest iron.

Output of the furnaces in the first two months of this year amounted to 15,244,099 tons (147,877 ferroalloys) compared with 12,453,067 tons (93,846 tons ferroalloys) in the like period of last year. Production by states for the February and the year to date:

Blast Furnace Production—February, 1960
(Net tons)

STATES	February 1960	First Two Months 1960
Massachusetts, New York	482,248	980,333
Pennsylvania	2,042,273	4,228,743
Maryland, Virginia, W. Virginia	647,343	1,303,546
Kentucky, Tennessee, Texas	153,053	320,374
Alabama	382,259	799,699
Ohio	1,405,623	2,914,692
Indiana	809,226	1,657,999
Illinois	662,408	1,358,235
Michigan, Minnesota	451,777	925,259
Colorado, Utah, California	377,792	755,219
Total	7,414,002*	15,244,099†

*Includes 71,533 tons of ferromanganese and spiegeleisen.
†Includes 147,877 tons of ferromanganese and spiegeleisen.
Data from American Iron & Steel Institute.

Tubular Goods . . .

Tubular Goods Prices, Page 191

Line pipe business is coming through slowly, largely because Federal Power Commission approval is awaited on some gas transmission projects. Leading pipemakers are hard pressed to keep their big mills operating.

In a generally easing market, a major tube supplier reports continuous weld pipe is its weakest product. Three to four months behind on deliveries when the steel strike ended, this maker has now liquidated its order backlog and is promising April shipment of new orders. Small diameter (2 to 4 in.) seamless standard pipe is the company's strongest product. Most new orders can be placed for May shipment.

Oil well drilling picked up in the week ended Mar. 14. Hughes Tool Co. counted 1683 rotary rigs in operation, a gain of 32 for the week. The total still was 320 under the number of rigs active in the same week a year ago.

Structural Shapes . . .

Structural Shape Prices, Page 187

Fabricated structural steel shipments in February totaled 240,850 tons, largest for any month since last June, reports the American Institute of Steel Construction. Deliveries for bridge and building construction during the month jumped 32,000 tons over those in the preceding month, and were 11 per cent greater than in February a year ago.

Shipments in the first two months of this year totaled 449,881 tons, 2 per cent more than in the like period of 1959.

A substantial increase was also recorded for February bookings with 288,825 tons, the second best month since last June when 291,000 tons were booked. In the first two

Stamco

slitting and coiling line saving time and material in west coast installation

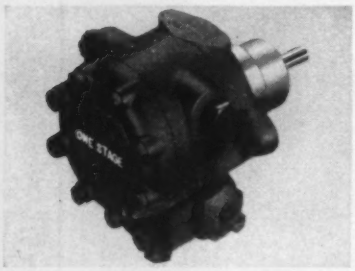
UTILITY APPLIANCE CO., of Los Angeles now has line to handle 20,000 lb. coils up to 48" wide and gauges up to ⅛ inch. Low investment—long life—make this a wise move toward reducing operating costs.

Stamco, Inc., New Bremen, Ohio, U.S.A.

Slitting and Coiling Lines • Cut-To-Length Lines • Flying Shear Lines • Power Squaring Shears • Automatic Resquaring • Corrugating • Culvert • Steel Mill Equipment

RELY-ABILITY

More than 6,000,000 homes are reliably served by oil burners equipped with Sundstrand fuel units



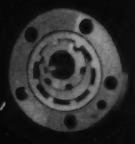
An estimated 9 billion gallons of fuel oil are pumped each year through the nozzles of more than 6,000,000 oil burners equipped with Sundstrand fuel units.

The ability of modern oil burners to perform reliably with little or no maintenance is a tribute to the manufacturers, dealers, and fuel oil suppliers who build, install, and service oil burners throughout America.

The record of dependable operation established by domestic oil-fired heating systems is backed by the reliable performance of Sundstrand fuel units . . . fuel units that each year pump fuel oil from the storage tanks to the oil burners of more than 6,000,000 American homes.

Other products of Sundstrand Rely-Ability include: industrial hydraulic components and systems . . . machine tools and accessories . . . packaging machinery . . . hydrostatic transmissions . . . aircraft and missile systems and components . . . and a wide range of small tools and specialty equipment.

Rota-roll pumping assembly—"heart" of every Sundstrand fuel unit. Patented design gives quiet, efficient operation, long life and uniform oil flow.



SUNDSTRAND CORPORATION

ROCKFORD, ILLINOIS

SUNDSTRAND

months this year, bookings amounted to 510,047 tons, slightly below the 530,151 tons booked in the same period last year.

The fabricating industry's backlog as of Feb. 29 was 2,189,234 tons, of which total 1,269,360 tons were scheduled for fabrication during the four months ending June 30.

A Texas fabricator recently booked 350 tons of tower steel for the Bonneville Power Administration in competition with British and Italian interests.

Bookings of New England fabricators are about 10 per cent below last year's. While they are estimating slightly more tonnage for the second quarter, bridge volume is below expectations.

Commercial and industrial buildings are being designed for reinforced concrete construction at a higher than usual ratio.

Fabricators are building up backlogs a little, but are competing keenly for new tonnage. Were it not for public work, demand would be dull.

Standard structurals are available for April delivery, wide flange sections for delivery in late April and early May.

Printed Circuit Motor Prices Are Reduced

Photocircuits Corp., Glen Cove, N. Y., last week announced price reductions on its printed circuit motors averaging 40 per cent. Its model PM368 now lists at $190 vs. $300 a year ago. Model PM488 is now $240. It was $450.

Alan P. Kingsbury, vice president-sales, says most sales prospects are considering the motors for servo applications. The almost weightless rotating portion of the motors is claimed to give them smooth torque at low speeds, and they can be stopped and reach full operating speeds within a few thousandths of a second.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 193

Jones & Laughlin Steel Corp. last week placed in operation a new battery of 59 smokeless type byproduct coke ovens at its Pittsburgh Works. The battery is part of a modernization program which, on completion next year, will increase coking capacity of the works by 60,000 tons monthly. The plant will then have 315 modern ovens equipped with the latest smoke control devices. Work is progressing on two batteries at the works, one of 59 ovens, and a second of 118.

Imports Go Begging In the Southwest

Excess stocks of foreign steel are going begging in the Houston market. One source reports that 55,000 tons of structurals are piled on docks in the area.

Texas steelmakers are finding it difficult to compete with the foreign offerings which are available at prices $20 to $25 a ton below the domestic levels. Production of structurals, reinforcing bars, barbed wire, and nails at the Houston mill was outstripped by imports during November and December, 1959, and in January this year. In March, the mill's shipping rate slipped to 75 per cent of capacity, though its ingot rate is still at 100 per cent.

New orders for foreign steel are slow. One foreign mill representative hasn't booked an order for the last two weeks. Reasons for the decline in foreign orders: Consumers are well supplied and expect lower prices, recalling that imports undersold domestic steel by $40 a ton a year ago.

Between 30,000 and 50,000 tons of imported steel of all types are reported piled on docks in the Los Angeles district. There is little demand for foreign steel at present.

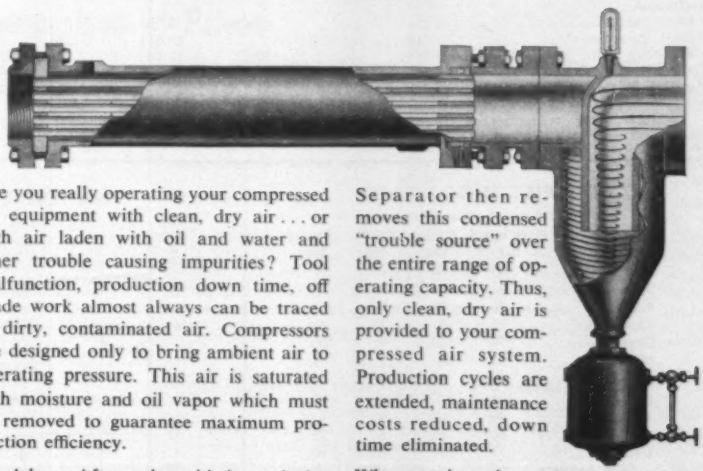
Iron Ore . . .

Iron Ore Prices, Page 193

Stocks of iron ore in the U. S. and Canada, at the end of January totaled 58,317,810 gross tons (2,341,409 Canadian, 55,976,401 U. S.), reports the American Iron Ore Association. On the same date a year ago, stocks were 61,194,194 tons (2,584,673 Canadian, 58,609,521 U. S.). The breakdown on the basis of origin of supplies is given in the accompanying table.

Consumption of ore in January (U. S. and Canadian) amounted to 12,420,426 gross tons (564,447 Ca-

You Are Sure of Trouble Free Compressed Air...with an Adams Aftercooler and Cyclone Separator



Are you really operating your compressed air equipment with clean, dry air . . . or with air laden with oil and water and other trouble causing impurities? Tool malfunction, production down time, off grade work almost always can be traced to dirty, contaminated air. Compressors are designed only to bring ambient air to operating pressure. This air is saturated with moisture and oil vapor which must be removed to guarantee maximum production efficiency.

An Adams Aftercooler with its exclusive Cyclone Separator, is specifically designed to remove unwanted water and oil from your compressed air. A standard Adams unit cools the compressed air to within 10° of the cooling water temperature for the condensation of oil and water vapor. The Adams scientifically designed Cyclone Separator then removes this condensed "trouble source" over the entire range of operating capacity. Thus, only clean, dry air is provided to your compressed air system. Production cycles are extended, maintenance costs reduced, down time eliminated.

Why not investigate the advantages of an R. P. Adams Aftercooler and Cyclone Separator in your compressed air system. Write today for your copy of Bulletin 714.

R. P. ADAMS CO., INC.
222 East Park Drive, Buffalo 17, New York.

nadian, 11,855,949 U. S.). (For a breakdown as to source, see table.) In January, 1959, consumption totaled 10,328,865 tons (497,224 Canadian, 9,831,641 U. S.).

On the last day of January, 239 blast furnaces were active, 226 in the U. S. and 13 in Canada. Only 34 stacks (32 in the U. S. and 2 in Canada) were idle. A year ago, 211 stacks were operating (202 in the U. S. and 9 in Canada).

Sluggish demand for iron ore is expected to force production cutbacks at some Lake Superior mines this month.

Iron Ore Statistics—January, 1960

STOCKS IN INVENTORY AT END OF THE MONTH
(Gross tons)

	U. S. Ores		Canadian Ores		Foreign	
At Furnace Yards:	**L. Superior**	**Other**	**L. Superior**	**Other**	**Ores**	**Totals**
Massachusetts, New York	2,158,119	45,347	88,294	181,422	315,314	2,788,496
Pennsylvania	5,629,129	316,203	28,406	557,957	6,654,962	13,186,657
Maryland, Virginia, W. Virginia	311,379	9,493	41,593	1,859,522	2,422,142	4,644,129
Kentucky, Tennessee, Texas	254,880	273,047	.....	303,095	138,741	969,763
Alabama	871	1,750,656	.....	129,208	3,313,887	5,194,622
Ohio	5,604,683	64,664	694,701	1,778,511	1,146,385	9,288,944
Indiana	4,771,622	24,056	319,570	.....	40,261	5,155,509
Illinois	3,451,793	17,981	30,967	.....	168,077	3,668,818
Michigan, Minnesota	2,357,753	.....	190,084	396,387	205,229	3,149,453
Colorado, Utah, California	.....	1,184,058	.....	.....	21,574	1,205,632
Undistributed	845	3,569	.....	.....	440	4,854
End of Month Totals	24,541,074	3,689,074	1,393,615	5,206,102	14,427,012	49,256,877
At U. S. Docks	2,106,776	.....	248,385	1,906,386	2,457,977	6,719,524
Total U. S. stocks	26,647,850	3,689,074	1,642,000	7,112,488	16,884,989	55,976,401
At Canada Furnaces	1,284,069	.....	233,694	784,113	39,533	2,341,409
Total U. S.-Canada	27,931,919	3,689,074	1,875,694	7,896,601	16,924,522	58,317,810

IRON ORE CONSUMPTION—JANUARY, 1960
(Gross tons)

	U. S. Ores		Canadian Ores		Foreign	
In U. S.:	**L. Superior**	**Other**	**L. Superior**	**Other**	**Ores**	**Totals**
Massachusetts, New York	489,415	90,179	37,325	89,113	60,866	766,898
Pennsylvania	1,282,110	239,803	.....	220,276	1,319,105	3,061,294
Maryland, Virginia, W. Virginia	71,242	41,336	8,268	322,037	525,758	968,641
Kentucky, Tennessee, Texas	25,530	78,342	.....	59,020	60,432	223,324
Alabama	.....	509,787	.....	.....	249,838	759,625
Ohio	1,301,084	43,812	161,517	425,312	310,423	2,242,148
Indiana	1,160,873	20,968	129,049	.....	19,683	1,330,573
Illinois	995,880	25,901	30,252	.....	62,182	1,114,215
Michigan, Minnesota	470,241	.....	99,781	126,092	57,236	753,350
Colorado, Utah, California	.....	615,268	.....	.....	19,934	635,202
Undistributed	203	462	.....	.....	14	679
In U. S.:						
Blast furnaces	4,065,066	1,035,125	352,582	760,394	1,065,243	7,278,410
Steel furnaces	170,578	81,462	12,705	6,479	628,194	899,418
Sintering (1)	1,560,877	548,711	100,905	472,734	990,618	3,673,845
Miscellaneous (2)	57	560	.....	2,243	1,416	4,276
Total U. S.	5,796,578	1,665,858	466,192	1,241,850	2,685,471	11,855,949
In Canada:						
Blast furnaces	186,386	.....	85,654	173,708	.....	445,748
Steel furnaces	3,618	.....	.....	16,057	11,183	30,858
Sintering (1)	29,734	.....	12,471	45,666	.....	87,871
Total Canada	219,738	.....	98,125	235,431	11,183	564,477
Total U. S.-Canada	6,016,316	1,665,858	564,317	1,477,281	2,696,654	12,420,426

1. Consumer in sintering plants not at mine site. 2. Sold to nonreporting companies.
Data from American Iron Ore Association.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

9600 tons, state bridgework, Kings County, New York, through Terry Contracting Co. and Fehehaber Corp., joint contractors, to Ingalls Iron Works, Birmingham.

2230 tons, 25 span bridge, relocation route No. 8 over No. 57, Seymour, Conn.; bids Apr. 11, State Highway Department; also, 1165 tons of reinforcing bars, 502 tons of steel piles, and 245 tons of mat reinforcement.

1428 tons, Contract 3, Cross Bronx Expressway for State of New York, through Johnson, Drake & Piper, general contractor, to Harris Structural Steel Co., New York.

1000 tons, offshore casing, Shell Oil Co., Harvey, La., to Kane Boiler Works, Galveston, Tex.

390 tons, gymnasium, Riverdale School, Bronx, N. Y., through Kuhn, Smith & Harris, general contractor, to White Plains Iron Works, Peekskill, N. Y.

350 tons, tower steel, to Creamer Industries, Ft. Worth, Tex., f.o.b. destination $205,000, by Bonneville Power Administration, Portland, Oreg.

250 tons, five-story telephone building addition, Spokane, Wash., to unstated contractor; Henry George & Sons, Spokane, general contractor.

229 tons, 4 span plate girder bridge, New Hartford-Canton, Conn.; bids Apr. 11, State Highway Department; also, 150 tons of reinforcing bars and 85 tons of steel piles.

STRUCTURAL STEEL PENDING

7000 tons, estimated, 37 story office building, First National City Bank, 42nd Street & Madison Avenue, New York, pending; George A. Fuller Co., New York, general contractor.

4800 tons, approach to state bridge, 62nd Street, Pittsburgh, John F. Casey Co., Pittsburgh, low on general contract.

4710 tons, state bridgework, Erie County, New York, bids closed Apr. 2.

2500 tons, mercantile building, Western Electric Co., Kearney, N. J., bids closed Mar. 30.

1600 tons, building 9, Department of Taxation & Finance, campus site, Albany, N. Y.; F. D. Rich Co. Inc., Stamford, Conn., is low on the general contract.

1250 tons, state bridgework, Cumberland County, Pennsylvania (prestressed concrete, alternate); C. J. Langenfelder, Baltimore, low on general contract.

1229 tons, state bridgework, Nassau and Suffolk Counties, New York, Zara Contracting Co., low on general contract.

1028 tons, state bridgework, Monroe County, New York, Johnson, Drake & Piper, low on general contract.

734 tons, state bridgework, Forest County, Pennsylvania, Charles A. Imel & Sons, Clarion, Pa., low on general contract.

712 tons, state bridgework, LR 187, Sec. 12, Allegheny County, Pennsylvania; also 804 tons, either shapes or prestressed concrete; Eidemiller Inc., Greensburg, Pa., low on the general contract.

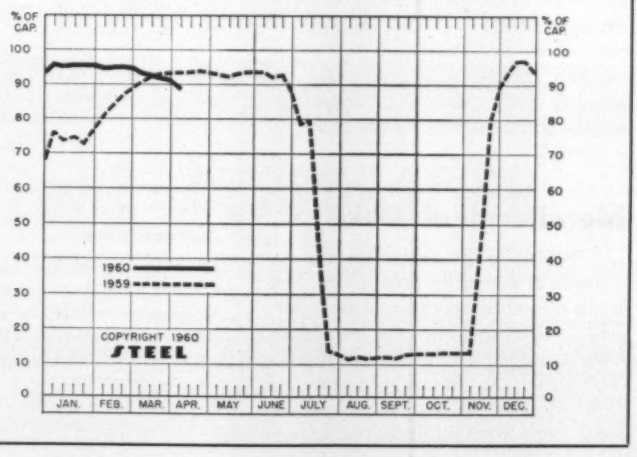
DISTRICT INGOT RATES

(Percentage of capacity utilized)

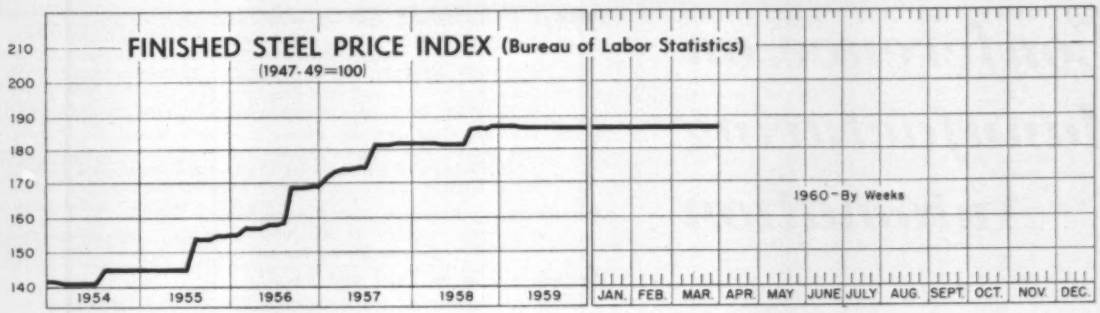
	Week Ended Apr. 3	Week Ago	Month Ago	Year Ago
Northeastern	86	86	90	97
Buffalo	94	103	99	96
Pittsburgh	88	90	96	96
Youngstown	78	81	87	88
Cleveland	99	103	97	100
Detroit	99	105	102	99
Chicago	94	97	96	92
Cincinnati	101	103	104	82
St. Louis	99	96	97	99
Southern	88	89	86	98
Western	75	76	88	93
Total Industry	88.7	91.1	92.8	93.2
Index (1947-49=100)	157.3	161.7	164.7	164.2
Net Tons (In thousands)	2,527	2,597	2,645	2,638

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Mar. 29, 1960	Week Ago	Month Ago	Feb. Index	Year Ago
186.8	186.8	186.8	186.8	186.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Mar. 29

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, Reinforcing	6.385
Rails, Light, 40 lb	7.292	Bars, C.F., Carbon	10.710
Tie Plates	6.875	Bars, C.F., Alloy	14.125
Axles, Railway	10.175	Bars, C.F., Stainless, 302 (lb)	0.570
Wheels, Freight Car, 33 in. (per wheel)	62.000	Sheets, H.R., Carbon	6.350
Plates, Carbon	6.350	Sheets, C.R., Carbon	7.300
Structural Shapes	6.167	Sheets, Galvanized	8.765
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Strip, C.R., Carbon	9.489
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Alloy	10.775	Strip, H.R., Carbon	6.250
Bars, H.R., Stainless, 303 (lb)	0.543	Pipe, Black, Buttweld (100 ft)	19.905
Bars, H.R., Carbon	6.675	Pipe, Galv., Buttweld (100 ft)	23.585
		Pipe, Line (100 ft)	199.533
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200	Black Plate, Canmaking Quality (95 lb base box)	7.900
Tubing, Mechanical, Carbon (100 ft)	27.005	Wire, Drawn, Carbon	10.575
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608	Wire, Drawn, Stainless, 430 (lb)	0.665
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100	Bale Ties (bundles)	7.967
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800	Nails, Wire, 8d Common	9.825
		Wire, Barbed (80-rod spool)	8.766
		Woven Wire Fence (20-rod roll)	21.880

STEEL's FINISHED PRICE INDEX*

	Mar. 30 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	194.53
Index in cents per lb	6.713	6.713	6.713	6.713	5.270

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$118.40
No. 2 Fdry, Pig Iron, GT.	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	33.33	34.00	35.00	37.00	37.41

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Mar. 30 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.30
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.30
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.55
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.40
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.25
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.25
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.53
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.225
Plates, Chicago	5.30	5.30	5.30	5.30	4.225
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.225
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.225
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.225
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.10
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.45
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	5.75
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	5.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	5.90
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	5.75
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.95	6.85
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$78.00
Wire rods, 7/32-5/8" Pitts.	6.40	6.40	6.40	6.40	4.675

PIG IRON, Gross Ton

	Mar. 30 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.66
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	55.16
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	60.58
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$34.50	$34.50	$35.50	$36.50	$38.50
No. 1 Heavy Melt, E. Pa.	35.00	36.00	36.00	36.00	37.75
No. 1 Heavy Melt, Chicago	31.50	31.50	33.50	38.50	36.00
No. 1 Heavy Melt, Valley	36.50	36.50	37.50	40.50	37.50
No. 1 Heavy Melt, Cleve.	33.50	33.50	34.50	36.50	35.00
No. 1 Heavy Melt, Buffalo	31.50	31.50	31.50	39.50	32.50
Rails, Rerolling, Chicago	53.50	53.50	57.50	60.50	50.50
No. 1 Cast, Chicago	45.50	45.50	46.50	47.50	41.50

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$13.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	25.25

Fourth Conference on Manufacturing Automation

TO BE HELD AT

Purdue University, Lafayette, Indiana
April 11, 12, and 13, 1960

For production executives, manufacturing engineers, and administrative managers who plan, design, and install automated systems for industry.

As in past conferences, informal discussion groups will be set up where automation authorities will be available to answer specific questions and exchange experiences. Exhibits of automation components and systems have also been arranged.

Cosponsored by

MANUFACTURING ENGINEERING COUNCIL
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AUTOMATION

FEE

Fee for the Third Conference on Manufacturing Automation is $85 which will include the Banquet, the noon Luncheons, and a copy of the Transactions.

LODGING

Rooms are available at the Union Club on the campus at $4 and $6 single, $6 double, and $7 to $9 twin. Room reservations may be made with the Union Club by the form supplied. Accommodations are also available at the Fowler Hotel in Lafayette (city bus to campus) from $3.50. Write direct. For those driving, reservations may be made at the Morris-Bryant Motel, Cedar Crest Motel, or Green Acres Motor Court (2-4 miles north on U. S. 52). For additional information, write K. E. Glancy, Div. of Adult Education, Purdue University, Lafayette, Ind.

CONFERENCE TOPICS AND SPEAKERS

Engineering Costs—Who Pays? (Automation Panel)

BUYERS K. C. BUTTERFIELD, Staff Master Mechanic, Chrysler Corp.
W. W. KUYPER, Manager, Manufacturing Engineering, Large Steam-Turbine Generator Dept., General Electric Co.
R. L. SCHOENBERGER, Manager, Production Engineering Dept., R. R. Donnelley & Sons Co.
W. A. STADTLER, Director of Manufacturing Research, I.B.M. Corp.

SELLERS J. R. BAREFOOT, President, Federal Machine & Welder Co.
LEO GAJDA, Vice President, Snyder Corp.
E. McFERREN, Vice President-Sales, Giddings & Lewis Machine Tool Co.
W. K. STOKES, Vice President-Sales, Alvey Ferguson Co.

Manufacturing Research and Automation
T. R. BUNNELL, Manager of Manufacturing Services, Semiconductor Div., Sylvania Electric Products Inc.

Getting a Grip on Costs and Payoff
K. H. MEYER, Manager, Mfg. Services, Reliance Electric & Engineering Co.

Organizing to Reduce Costs through Automation
C. D. EVANS, Ass't. Manager, Mfg. Research, International Harvester Co.

Process Analysis and Machine Procurement
H. A. LEONE, Manager, Headquarters Mfg. Lab., Westinghouse Electric Corp.

Automating Assembly
C. H. STANDISH, President, Designers for Industry Inc.

Integrating the Packaging Operation
WILLIAM WOOD, President, Processes Research Inc.

Techniques for Parts Handling
R. H. BONNER, Application Engr., Industrial & Machine Tool Operations, Radio Corp. of America

Dispensing Problem Materials in Process
L. E. HARPER, President, Omega Machine Co. Div., B-I-F Industries Inc.

Mechanization for Distribution
E. J. HARDY, Ass't. Supt., Engineering Equipment Development, Western Electric Co.

Temperature Controls
H. G. PAYNE, Manager, Measurement Group Sales Product Div., Foxboro Co.

Using Relay Control Effectively
ZEKE SMITH, Vice President & Tech. Dir., Potter & Brumfield Div., American Machine & Foundry Co.

Doing the Job with Photoelectrics
J. J. LAREW, Product Engr., Specialty Control Dept., General Electric Co.

LUNCHEON AND BANQUET TOPICS AND SPEAKERS

Pioneering in Automation
W. C. LEONE, Vice Pres. & Gen'l. Mgr., Electronics Div., Rheem Mfg. Co.

You and the MEC
F. I. ELLIN, Chief Production Engr., Ohmite Mfg. Co.

A Look Into Tomorrow
JOSEPH HARRINGTON JR., Head, Mechanical Engineering Section, Arthur D. Little Inc.

Don't Give Up
ROBERT MOORE, President, Moore Equipment Co.

The Inevitability of Automation
H. A. STRICKLAND JR., Vice President & Gen'l. Mgr., Industrial Electronics Div., General Electric Co.

Mail to: AUTOMATION CONFERENCE, Comptroller's Office (Conferences), Purdue University.

ROOM RESERVATION

Please reserve in the Union Club the accommodations checked:

Nights: April 11 ☐ April 12 ☐ April 13 ☐

Single Bed—Bath ☐ Twin Beds—Bath ☐

If necessary, will share twin-bed with another member ☐

Room will be shared by _____

Please send confirmation:

Name _____

Company _____

Address _____

CONFERENCE REGISTRATION

The following persons plan to attend the AUTOMATION CONFERENCE, April 11, 12, and 13, 1960 (name and title, please):

Name _____

Title _____

Name _____

Title _____

$_____ is enclosed for the registrations checked at $85 each. (Make checks payable to Purdue University.)

☐ Fees will be paid at registration time.

Name _____

Company _____

Address _____

Steel Prices

Mill prices as reported to STEEL, Mar. 30, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 188; footnotes, page 190.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ....$76.00

INGOTS, Alloy (NT)
Detroit S41 ....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 ....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
Sharon,Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bartonville,Ill. K4 ..$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 .80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton,Pa. U5 ....99.50
Conshohocken,Pa. A3 .104.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 ....109.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14 99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 ....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 ....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3..126.00
Detroit S41 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14 119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ....$122.50
Canton,O. R2 ....125.00
Cleveland R2 ....122.50
Gary,Ind. U5 ....122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5 ..122.50
Warren,O. C17 ....122.50

SKELP
Aliquippa,Pa. J5 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren,O. R2 ....5.05
Youngstown R2, U5 ...5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 ....6.40
Alton,Ill. L1 ....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora,Pa. A7 ....6.40
Fairfield,Ala. T2 ....6.40
Houston S5 ....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 ....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 ....6.50
LosAngeles B3 ....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 ....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 ....6.50
Struthers,O. Y1 ....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ..5.50
Aliquippa,Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Houston S5 ....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 ....5.55
Joliet,Ill. P22 ....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
Los Angeles B3 ....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 ....5.50
Niles,Calif. P1 ....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 ....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 ....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 ....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 ....5.50
Sterling,Ill. N15 ....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....6.90
Munhall,Pa. U5 ....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ....8.05
Bessemer,Ala. T2 ....8.05
Bethlehem,Pa. B2 ....8.10
Clairton,Pa. U5 ....8.05
Fairfield,Ala. T2 ....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 ....8.05
Geneva,Utah C11 ....8.05
Houston S5 ....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 ....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 ....8.75
Munhall,Pa. U5 ....8.05
Seattle B3 ....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 ....7.75
Struthers,O. Y1 ....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 ....8.05
S.Chicago,Ill. U5 ....8.05
Sterling,Ill. N15 ....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 ....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 ....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 ....5.30
Ashland,Ky.(15) A10 ..5.30
Atlanta A11 ....5.50
Bessemer,Ala. T2 ....5.30
Clairton,Pa. U5 ....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 ....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 ....5.30
Farrell,Pa. S3 ....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 ....5.30
Geneva,Utah C11 ....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 ....5.30
Houston S5 ....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 ....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 ....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 ....5.30
Newport,Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale,Ill. A1 ....5.30
Seattle B3 ....6.20
Sharon,Pa. S3 ....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 ....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 ....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 ....7.05
Houston S5 ....7.15
Johnstown,Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S. L.A.
Aliquippa,Pa. J5 ....7.95
Ashland,Ky. A10 ....7.95
Bessemer,Ala. T2 ....7.95
Clairton,Pa. U5 ....7.95
Claymont,Del. C22 ....7.95
Cleveland J5, R2 ....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 ....7.95
Ecorse,Mich. G5 ....7.95
Fairfield,Ala. T2 ....7.95
Farrell,Pa. S3 ....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 ....7.95
Geneva,Utah C11 ....7.95
Houston S5 ....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 ....7.95
Munhall,Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.85
Sharon,Pa. S3 ....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Warren,O. R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 ....7.50
Claymont,Del. C22 ....7.50
Coatesville,Pa. L7 ....7.50
Economy,Pa. B14 ....7.50
Farrell,Pa. S3 ....7.50
Fontana,Calif. K1 ....8.30
Gary,Ind. U5 ....7.50
Houston S5 ....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 ....7.50
Lowellville,O. S3 ....7.50
Munhall,Pa. U5 ....7.50
Newport,Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon,Pa. S3 ....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2..7.50
Youngstown Y1 ....7.50

FLOOR PLATES
Cleveland J5 ....6.375
Conshohocken,Pa. A3..6.375
Ind.Harbor,Ind. I-2 ....6.375
Munhall,Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S.Chicago,Ill. U5 ....6.375

PLATES, Ingot Iron
Ashland c.l. (15) A10 ..5.55
Ashland l.c.l. (15) A10..6.05
Cleveland c.l. R2 ....6.05
Warren,O. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa. (9) J5 ...5.675
Alton,Ill. L1 ....5.875
Atlanta(9) A11 ....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ..5.675
Buffalo(9) R2 ....5.675
Canton,O.(23) R2 ....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 ....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 ....5.675
Houston(9) S5 ....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 ....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 ....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ..5.675
Seattle A24, B3, N15 ..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15 ..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 ..6.375
Warren,O. C17 ....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 ....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 ....6.725
Detroit S41 ....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 ....6.725
Fairless,Pa. U5 ....6.875
Farrell,Pa. S3 ....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 ....6.725
Houston S5 ....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 ....7.775
Lowellville,O. S3 ....6.725
Massillon,O. R2 ....6.725
Midland,Pa. C18 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 ....6.725
Sharon,Pa. S3 ....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 ....6.725
Warren,O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ....8.30
Bessemer,Ala. T2 ....8.30
Bethlehem,Pa. B2 ....8.30
Clairton,Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse,Mich. G5 ....8.30
Fairfield,Ala. T2 ....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 ....8.30
Houston S5 ....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 ....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Struthers,O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 ....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ...5.675
Sterling,Ill. N15 ....5.775
Sterling,Ill.(1) N15 ...5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet,Ill. P22 ....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 ....6.52
Seattle B3 ....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon
LosAngeles P2, S30 ..11.75*

Alloy
Ambridge,Pa. W18 ....10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria,O. W8 ....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.05c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2..7.65
Birmingham C15 ....8.25
Buffalo B5 ....7.70
Camden,N.J. P13 ....8.10
Carnegie,Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 ....7.85
Detroit S41 ....7.65
Donora,Pa. A7 ....7.65
Elyria,O. W8 ....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 ....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 ....7.65
LosAngeles (49) S30 ....9.10
LosAngeles(49) P2, R2.9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 ....7.65
Monaca,Pa. S17 ....7.65
Newark,N.J. W18 ....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 ....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 ....7.65
Warren,O. C17 ....7.65
Waukegan,Ill. A7 ....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden,N.J. P13 ....9.20
Canton,O. T7 ....9.025
Carnegie,Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 ....9.225
Detroit S41 ....9.025
Donora,Pa. A7 ....9.025
Elyria,O. W8 ....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 ....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 ....9.025
Lackawanna,N.Y. B2 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 ....9.025
Monaca,Pa. S17 ....9.025
Newark,N.J. W18 ....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20
Struthers,O. Y1 ....9.025
Warren,O. C17 ....9.025

Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.675
Birmingham C15 .....5.675
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 .....6.375
Ft.Worth,Tex(4)(26)T4 5.925
Gary,Ind. U5 .....5.675
Houston S5 .....5.925
Ind.Harbor,Ind. I-2,Y1 5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.925
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 .5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.925
Seattle A24, B3, N14 .6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.San Francisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.60
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.60
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.60
Seattle A24, B3, N14 ..7.95
SparrowsPt.,Md. B2 ....7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled) B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa. (3) F5 ..5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O. (3) P11 ....5.575
Tonawanda (3) B12 ...5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ...5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif.C11 .....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 ..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ...5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 ....6.275

SHEETS, H.R., Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Lackawanna(35) B2 ..7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ....7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ...6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 .....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ....7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 ..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 .....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225*	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2 ..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 .....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ...7.625*
Pittsburgh J5 .....6.875†
SparrowsPt., Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ...7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America

T2 Tenn. Coal & Iron
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala. City, Ala. (27) R2	5.10
Allenport, Pa. P7	5.10
Alton, Ill. L1	5.30
Ashland, Ky. (8) A10	5.10
Atlanta A11	5.10
Bessemer, Ala. T2	5.10
Birmingham C15	5.10
Conshohocken, Pa. A3	5.15
Detroit M1	5.10
Ecorse, Mich. G5	5.10
Fairfield, Ala. T2	5.10
Farrell, Pa. S3	5.10
Fontana, Calif. K1	5.825
Gary, Ind. U5	5.10
Ind. Harbor, Ind. I-2, Y1	5.10
Johnstown, Pa. (25) B2	5.10
Lackaw'na, N.Y. (25) B2	5.10
LosAngeles (25) B3	5.85
LosAngeles C1	8.60
Minnequa, Colo. C10	6.20
Riverdale, Ill. A1	5.10
SanFrancisco S7	6.60
Seattle (25) B3	6.10
Seattle N14	6.60
Sharon, Pa. S3	5.10
S. Chicago, Ill. W14	5.10
S. SanFrancisco (25) B3	5.85
SparrowsPoint, Md. B2	5.10
Torrance, Calif. C11	5.85
Warren, O. R2	5.10
Weirton, W. Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18	8.40
Farrell, Pa. S3	8.40
Gary, Ind. U5	8.40
Houston S5	8.65
Ind. Harbor, Ind. Y1	8.40
KansasCity, Mo. S5	8.65
LosAngeles B3	9.60
Lowellville, O. S3	8.40
Newport, Ky. A2	8.40
Sharon, Pa. A2, S3	8.40
S. Chicago, Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland, Ky. A10	7.575
Bessemer, Ala. T2	7.575
Conshohocken, Pa. A3	7.575
Ecorse, Mich. G5	7.575
Fairfield, Ala. T2	7.575
Farrell, Pa. S3	7.575
Gary, Ind. U5	7.575
Ind. Harbor, Ind. I-2, Y1	7.575
Lackawanna, N.Y. B2	7.575
LosAngeles (25) B3	8.325
Seattle (25) B3	8.575
Sharon, Pa. S3	7.575
S. Chicago, Ill. W14	7.575
S. SanFrancisco (25) B3	8.325
SparrowsPoint, Md. B2	7.575
Warren, O. R2	7.575
Weirton, W. Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10	5.35
Warren, O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn, Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover, O. G6	7.425
Evanston, Ill. M22	7.525
Farrell, Pa. S3	7.425
Follansbee, W. Va. W10	7.425
Fontana, Calif. K1	9.20
FranklinPark, Ill. T6	7.525
Ind. Harbor, Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport, Pa. E10	7.525
NewBedford, Mass. R10	7.875
NewBritain, Conn. S15	7.875
NewCastle, Pa. B4, E5	7.425
NewHaven, Conn. D2	7.875
NewKensington, Pa. A6	7.425
Pawtucket, R.I. R3	7.975
Pawtucket, R.I. N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale, Ill. A1	7.525
Rome, N.Y. (32) R6	7.425
Sharon, Pa. S3	7.425
Trenton, N.J. (31) R5	8.875
Wallingford, Conn. W2	7.875
Warren, O. R2, T5	7.425
Worcester, Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie, Pa. S18	15.55
Cleveland A7	15.55
Dover, O. G6	15.55
Farrell, Pa. S3	15.55
FranklinPark, Ill. T6	15.55
Harrison, N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville, O. S3	15.55
Pawtucket, R.I. N8	15.90
Riverdale, Ill. A1	15.55
Sharon, Pa. S3	15.55
Worcester, Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn, Mich. S3	10.80
Dover, O. G6	10.80
Farrell, Pa. S3	10.80
Ind. Harbor, Ind. Y1	10.80
Sharon, Pa. S3	10.80
Warren, O. R2	10.80

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover, O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	8.95	10.40	12.60	15.60	....
Farrell, Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria, O. S1	10.05	10.40	12.60	15.60	....
FranklinPark, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison, N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	....	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain, Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle, Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven, Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington, Pa. A6	9.85	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon, Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	....	10.70	12.90	15.90	18.85
Wallingford, Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55
Spring Steel (Tempered)			**0.80C**	**1.05C**	**1.35C**
Bristol, Conn. W1	...	...	18.85	22.95	27.80
Buffalo W12	...	...	15.85	....	....
Fostoria, O. S1	...	...	19.05	22.15	....
FranklinPark, Ill. T6	...	...	19.20	23.30	28.15
Harrison, N.J. C18	...	...	18.85	22.95	27.80
NewYork W3	...	...	18.85	22.95	27.80
Palmer, Mass. W12	...	...	18.85	....	....
Trenton, N.J. R5	...	...	18.85	22.95	27.80
Worcester, Mass. A7, T6	...	...	18.85	22.95	27.80
Youngstown S41	...	...	19.20	23.30	28.15

STRIP, Galvanized (Continuous)

Farrell, Pa. S3	7.50
Sharon, Pa. S3	7.50

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell, Pa. S3	5.525
Riverdale, Ill. A1	5.675
Sharon, Pa. S3	5.525
Youngstown U5	5.525

Weirton, W. Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2 .....8.175

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover, O. G6	7.425*
Evanston, Ill. M22	7.525*
McKeesport, Pa. E10	7.50*
Riverdale, Ill. A1	7.525*
Warren, O. B9, S3, T5	7.425*
Worcester, Mass. A7	7.975
Youngstown S41, Y1	7.425*

*Plus galvanizing extras.

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa, Pa. J5	$9.10	$9.35	$9.75
Fairfield, Ala. T2	9.20	9.45	9.85
Fairless, Pa. U5	9.20	9.45	9.85
Fontana, Calif. K1	9.75	10.00	10.40
Gary, Ind. U5	9.10	9.35	9.75
GraniteCity, Ill. G4	9.20	9.45	9.60
IndianaHarbor, Ind. I-2, Y1	9.10	9.35	9.75
Irvin, Pa. U5	9.10	9.35	9.75
Niles, O. R2	9.10	9.35	9.75
Pittsburg, Calif. C11	9.75	10.00	10.40
SparrowsPoint, Md. B2	9.10	9.35	9.75
Weirton, W. Va. W6	9.10	9.35	9.75
Yorkville, O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa, Pa. J5 (21-27 Ga.)	....	7.90	8.10	....
IndianaHarbor, Ind. Y1 (20-27 Ga.)	....	7.90	....	....
Niles, O. R2 (20-27 Ga.)	....	7.90	8.10	8.30

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$10.40	$10.65
Fairfield, Ala. T2	10.50	10.75
Fontana, Calif. K1	11.05	11.30
Gary, Ind. U5	10.40	10.65
Ind. Harb. Y1	10.40	10.65
Irvin, Pa. U5	10.40	10.65
Pitts., Calif. C11	11.05	11.30
Sp. Pt., Md. B2	10.40	10.65
Weirton, W. Va. W6	10.40	10.65
Yorkville, O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa, Pa. J5	$8.20
Fairfield, Ala. T2	8.30
Fairless, Pa. U5	8.30
Fontana, Calif. K1	8.85
Gary, Ind. U5	8.20
GraniteCity, Ill. G4	8.30
Ind. Harbor, Ind. I-2, Y1	8.20
Irvin, Pa. U5	8.20
Niles, O. R2	8.20
Pittsburg, Calif. C11	8.85
SparrowsPoint, Md. B2	8.20
Weirton, W. Va. W6	8.20
Yorkville, O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa, Pa. J5	7.85
Gary, Ind. U5	7.85
GraniteCity, Ill. G4	7.95
Ind. Harbor, Ind. Y1	7.85
Irvin, Pa. U5	7.85
Yorkville, O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary, Ind. U5	$10.05
Irvin, Pa. U5	10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W. Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge, Pa. A4	....	....	12.40	13.55	14.65
GraniteCity, Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor, Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield, O. E6	9.875*	11.70	12.40	13.55	14.65
Newport, Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles, O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift, Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren, O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift, Pa. U5	8.10
Mansfield, O. E6	8.10
Warren, O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom, W. Va. W10	15.70	16.30	16.80	17.85
Vandergrift, Pa. U5	15.70	16.30	16.80	17.85
Zanesville, O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler, Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift, Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren, O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity, Ala. R2	8.00
Aliquippa, Pa. J5	8.00
Alton, Ill. L1	8.20
Atlanta A1	8.00
Bartonville, Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville, Ind. M8	8.10
Donora, Pa. A7	8.00
Duluth A7	8.00
Fairfield, Ala. T2	8.00
Fostoria, O. (24) S1	8.10
Houston S5	8.25
Jacksonville, Fla. M8	8.35
Johnstown, Pa. B2	8.00
Joliet, Ill. A7	8.00
KansasCity, Mo. S5	8.25
Kokomo, Ind. C16	8.10
LosAngeles B3	8.95
Minnequa, Colo. C10	8.25
Monessen, Pa. P7, P16	8.00
Palmer, Mass. W12	8.30
Pittsburg, Calif. C11	8.95
Portsmouth, O. P12	8.00
Rankin, Pa. A7	8.00
S. Chicago, Ill. R2	8.00
S. SanFrancisco C10	8.95
SparrowsPoint, Md. B2	8.10
Sterling, Ill. (1) N15	8.00
Sterling, Ill. N15	8.10
Struthers, O. Y1	8.00
Waukegan, Ill. A7	8.00
Worcester, Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria, O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville, Ill. K4	12.85
Buffalo W12	13.40
Cleveland A7	12.65
Donora, Pa. A7	12.65
Duluth A7	12.65
Johnstown, Pa. B2	13.40
KansasCity, Mo. U3	12.90
Minnequa, Colo. C10	12.775
Monessen, Pa. P7, P16	12.65
Muncie, Ind. I-7	13.60
NewHaven, Conn. A7	12.95
Palmer, Mass. W12	13.70
Pittsburg, Calif. C11	13.45
Portsmouth, O. P12	12.65
Roebling, N.J. R5	12.95
SparrowsPt., Md. B2	13.50
Struthers, O. Y1	13.40
Trenton, N.J. A7	12.95
Waukegan, Ill. A7	12.65
Worcester, Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5	9.75
Alton, Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora, Pa. A7	9.75
Duluth A7	9.75
Johnstown, Pa. B2	9.75
KansasCity, Mo. S5, U3	10.00
Kokomo, Ind. C16	9.85
LosAngeles B3	10.70
Minnequa, Colo. C10	9.95
Monessen, Pa. P7, P16	9.75
NewHaven, Conn. A7	10.05
Palmer, Mass. W12	10.05
Pittsburg, Calif. C11	10.70
Portsmouth, O. P12	9.75
Roebling, N.J. R5	10.05
S. Chicago, Ill. R2	9.75
S. SanFrancisco C10	10.70
SparrowsPt., Md. B2	9.85
Struthers, O. Y1	9.75
Trenton, N.J. A7	10.05
Waukegan, Ill. A7	9.75
Worcester, Mass. A7, J4, T6	10.05

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1	16.50
Bartonville, Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville, Ind. M8	16.40
Fostoria, O. S1	16.30
Houston S5	16.55
Jacksonville, Fla. M8	16.65
Johnstown, Pa. B2	16.30
KansasCity, Mo. S5	16.55
Kokomo, Ind. C16	16.30
Minnequa, Colo. C16	16.55
Monessen, Pa. P16	16.30
Muncie, Ind. I-7	16.50
Palmer, Mass. W12	16.60
S. SanFrancisco C10	17.15
Waukegan, Ill. A7	16.30
Worcester, Mass. A7, J6	16.60

WIRE, Tire Bead

Bartonville, Ill. K4	17.15
Monessen, Pa. P16	17.15
Roebling, N.J. R5	17.65

ROPE WIRE (A)

Bartonville, Ill. K4	13.45
Buffalo W12	13.45
Fostoria, O. S1	13.45
KansasCity, Mo. U3	13.70
Johnstown, Pa. B2	13.45
Monessen, Pa. P7	13.45
Muncie, Ind. I-7	13.65
Palmer, Mass. W12	13.75
Portsmouth, O. P12	13.45
Roebling, N.J. R5	13.75
St. Louis L8	13.45
SparrowsPt., Md. B2	13.55
Struthers, O. Y1	13.45
Worcester, Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

Wire, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock — Col.

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	*8.88*
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	*8.88*
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.49
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	*9.16*
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	*9.16*
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.79
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	*9.21*
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	*9.21*
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.84
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga. — Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	192§
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)	An'ld Galv. Stone
Ala.City,Ala.R2	17.85 19.40**
Aliq'ppa,Pa. J5	17.85 19.65
Bartonville K4	17.95 19.80
Cleveland A7	17.85 ....
Craw'dville M8	17.95 19.80‡‡
Fostoria,O. S1	18.35 19.90†
Houston S5	18.10 19.65**
Jacksonville M8	18.95 19.80‡‡
Johnstown B2	17.85 19.65§
Kan.City,Mo. S5	18.10 ....
Kokomo C16	17.95 19.50†
Minnequa C10	18.10 19.65**
P'lm'r,Mass.W12	18.15 19.70†
Pitts.,Calif. C11	18.20 19.75†
S.SanFran.C10	18.20 19.75**
St'ling(37) N15	17.95 19.80
SparrowsPt. B2	17.95 19.75§
Waukegan A7	17.85 19.40†
Worcester A7	18.15 ....

WIRE, Merchant Quality

(6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.325§
Atlanta(48)A11	9.10 9.775§
Bartonville(48) K4	9.85 19.90
Buffalo W12	9.00 9.55†
Cleveland A7	9.00 ....
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55†
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65†
LosAngeles B3	9.95 10.625§
Minnequa C10	9.25 9.80**
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
S.Chicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48) N15	9.10 9.80
Struthers,O. Y1	9.00 9.65‡
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts, per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nuts 1¼ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, standard stock sizes:

Plain Finish	50
Hot Galvanized and zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

CAP AND SETSCREWS, Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packages	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam, 6 in. and shorter:	
Packages	+ 5
Bulk	+19
Through 1 in. diam., longer than 6 in.:	
Packages	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85

⅞ in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Alton,Ill. L1	$28.95	$43.40	$55.40	$73.00	$95.10
Buffalo W12	28.95	43.40	55.40	73.00	95.10
Cleveland A7	28.95	43.40	55.40	73.00	....
KansasCity,Mo. U3	29.85	43.00	55.40	73.00	95.10
Monessen,Pa. P16	32.15	48.20	61.55	81.10	105.65
N'wHaven,Conn. A7	28.95	43.40	55.40	73.00	95.10
Pittsburg,Calif. C11	28.95	43.40	55.40	73.00	95.10
Minnequa,Colo. C10	28.95	43.40	55.40	73.00	95.10
Roebling,N.J. R5	28.95	43.40	55.40	73.00	95.10
SparrowsPoint,Md. B2	28.95	43.40	55.40	73.00	95.10
St. Louis L8	28.95	43.40	55.40	73.00	95.10
Waukegan,Ill. A7	28.95	43.40	55.40	73.00	95.10

BOILER TUBES

Net base c.l. prices, dollars per 100 ft. mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Standard All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.60	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	6.875

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh B44	15.35
Seattle B3	15.85

SCREW SPIKES

Lebanon,Pa. B2	15.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1¼ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 6.295c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds, 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.72		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp., American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co., Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	48.90	59.55	70.15	80.55	....
Nickel	41.65	51.95	63.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	$36.80	$44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	V-Cr Hot Work (H-13)	0.550
Spec. Carbon (W-1)	0.385	W-Cr Hot Work (H-12)	0.530
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C1[illegible]	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Everett, Mass. E1	67.50	68.00	68.50	....
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	....	62.50‡	66.50	....
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% Silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.035% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075%)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Seattle, 10,000 lb and in San Francisco, 2000 to 4999 lb. City delivery charges are 15 cents per 100 lb except: Denver, Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Birmingham, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Baltimore	8.53	10.00	10.06	....	10.94	9.33	11.80	16.38	9.92	9.15	10.50
Birmingham	9.43	10.20	10.46	....	10.41	9.09	13.14	16.76	9.00	9.29	10.90
Boston	9.63	10.40	11.77	53.50	11.60	9.91	13.35	16.59	10.52	9.71	11.28
Buffalo	8.80	9.95	11.15	55.98	10.65	9.00	11.45	16.30	9.65	9.00	10.85
Charlotte, N. C.	10.81	11.22	11.34	....	12.29	10.97	12.68	....	11.38	11.17	12.18
Chicago	8.74	10.20	10.95	53.00	10.40	8.84	10.65	15.95	9.33	8.67	10.46
Cincinnati	8.91	10.26	11.00	53.43	10.72	9.16	11.53	16.27	9.89	9.05	10.79
Cleveland	8.73	9.88	11.14	52.33	10.51	8.96	11.25	16.06	9.75	8.92	10.56
Dallas	10.07	10.81	12.59	....	11.68	9.53	12.98	16.95	9.74	9.87	11.52
Detroit	9.00	10.46	11.30	56.50	10.77	9.15	11.01	16.23	9.89	9.04	10.72
Houston	9.67	10.41	12.19	52.00	11.28	9.13	13.10	16.55	9.34	9.47	11.12
Indianapolis	9.18	10.64	11.39	....	10.84	9.28	11.09	16.39	9.77	9.11	10.90
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	9.95	11.55	12.20	57.60	11.55	9.75	14.20	17.35	10.00	10.00	11.85
Milwaukee	8.88	10.34	11.09	....	10.54	8.98	10.89	16.09	9.55	8.81	10.60
New York	9.36	10.13	11.35	53.08	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	9.10	10.00	10.89	52.17	11.10	9.50	11.95	16.38	9.85	9.55	10.55
Pittsburgh	8.73	9.88	11.03	52.33	10.49	8.85	11.25	15.95	9.36	8.68	10.32
St. Louis	8.54	10.58	11.33	....	10.50	8.95	11.28	16.33	9.45	8.78	10.57
St. Paul	9.00	9.59	10.74	....	10.66	9.12	11.49	16.54	9.63	8.95	10.49
San Francisco	10.90	11.85	11.55	55.10	12.15	10.65	15.10	17.25	10.85	10.90	12.90
Seattle	11.55	12.30	12.50	56.52	12.65	11.10	16.20	17.80	11.20	11.00	13.10
Spokane, Wash.	11.55	12.30	12.50	57.38	13.15	11.60	16.20	17.80	11.20	11.00	13.60

Specifications: Hot rolled sheet, sheared edge, 10 Ga. x 36 x 96-120 in.; cold rolled sheets, 20 Ga. x 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, ¾ in.—2½ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, ¼ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Ores

Lake Superior Iron Ore

(Prices effective at start of the 1959 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1959, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	21.00†
Brazilian iron ore, 68.5%	21.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.00-19.50
Domestic, concentrates, f.o.b. milling points	22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-48%, Indian, 88-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.00†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

50-55%	$2.50-2.75
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Canadian Steel

(Cents per pound, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon, Forging Quality (net ton)	$97.00
Alloy (net ton)	115.00
Wire Rods:	
Carbon, $\frac{7}{32}$" to under ¼ in.	5.30
Carbon, ¼ in. to 47/64 in.	5.70
Alloy	6.40
Wire (carload lots)	8.40
Bars & Small Shapes:	
Carbon, merchant quality	5.40
Carbon, special quality	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Structural Size Angles & Zees	5.40
Plates:	
Carbon	5.45
Sheets & Coils, Hot Rolled:	
Carbon Sheets	5.00
Carbon Strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon Sheets	6.35
Carbon Strip (0.080 and lighter)	6.35
Carbon Strip (0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard Quality	6.70
Culvert Quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field Grade	9.00
Armature Grade	9.50
Electrical Grade	10.15
Tin Mill Products (Per Base Box; 100 lb base wt)	
Coke Tin Plate (1.25 lb pot yield)	$10.60
Electrolytic Tin Plate (0.25 lb coating)	9.10
Black Plate	8.30
Nails, c.l. lots, 400 keg min. (per keg)	$8.15

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.87% Fe, irreg. fragments, ⅛ in. x 1.3 in. (In contract lots of 240 tons price is 22.75c)	28.75
Annealed, 99.5% Fe	36.75
Unannealed (99+% Fe)	33.25
Unannealed (99+% Fe) (minus 325 mesh)	58.25
Powder Flake (minus 16 plus 100 mesh)	29.25
Carbonyl Iron:	
98.1-98.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500-lb drum freight allowed, c.l. 38.50; ton lots 40.50	
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	35.10-52.20†
Bronze, 5000-lb lots	53.10-56.70†
Copper, electrolytic	14.25*
Copper, reduced	14.25*
Lead	7.50*
Manganese, Electrolytic: Minus 35 mesh	$1.00
Nickel	$1.15
Nickel-Silver, 5000-lb lots	60.70-69.00†
Phosphor-Copper, 5000-lb lots	66.00
Copper (atomized) 5000-lb lots	46.50-64.50
Solder	7.00*
Silicon	70.00*
Stainless Steel, 304	89.00*
Stainless Steel, 316	$1.07
Tin	14.00*
Zinc, 5000-lb lots	21.20-34.40‡
Tungsten: Carbon reduced, 98.8% min., minus 65 mesh	Dollars nom.**
Chromium electrolytic 99.8% Cr, min., metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §Cutting and scarfing grade. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens:	
New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.95	$6.00	$5.85	$5.70	$6.10
Bar Size Angles	5.95	6.00	5.85	5.75	6.10
Structural Angles	5.86	5.91	5.76	5.66	6.01
I-Beams	5.86	5.91	5.76	5.66	6.01
Channels	5.86	5.91	5.76	5.66	6.01
Plates (basic bessemer)	5.98	6.03	5.88	5.78	6.13
Sheets, H.R.	7.50	7.55	7.40	7.30	7.65
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	9.70	9.75	9.60	9.50	9.85
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	9.60	9.65	9.50	9.40	9.75
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.08	24.20	24.42	24.15	25.47
Barbed Wire (†)	6.50	6.55	6.40	6.30	6.65
Merchant Bars	6.39	6.44	6.29	6.19	6.54
Hot-Rolled Bands	7.90	7.95	7.80	7.70	8.05
Wire Rods, Thomas Commercial No. 5	6.60	....	6.45	6.45	6.70
Wire Rods, O. H.	7.05	....	6.90	6.90	7.15
Bright Common Wire Nails (§)	7.80	7.85	7.50	7.60	7.95

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	5.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton. Palmerton, Pa. 21-23% Mn, $102.50, 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net tons, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35 less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c.

Blocking Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c; No. 2 (Cr 58-63%, C 5-6%, Si 8-10%), 23.00c; No. 3 (Cr 58-63%, C 5-6%, Si 10-12%), 23.00c.

Refined Charge Chrome: No. 1 (Cr 50-55%, C 5% max, Si 2% max), 25.00c; No. 2 (Cr 56-60% C 5% max, Si 2% max), 25.00c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 31.50c per lb contained Cr; 0.010% max, 32.50c. Delivered.
Cr 67-71%, carload, lump, bulk, 0.025% max, 34.50c; 0.05% max, 33.50c; 0.10% max, 33.25c; 0.20% max, 33.00c; 0.50% max, 32.75c; 1.0% max, 32.50c; 1.5% max, 32.25c; 2.0% max, 32.00c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed, 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 26.25c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 28.25c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down 29.40c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot, packed, 2" x D plate (about ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al 40%, Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l., packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb of briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 40% approx, Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 19.25c. Packed c.l. 20.25c, 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Sigio, Tenn., $120 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans, $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

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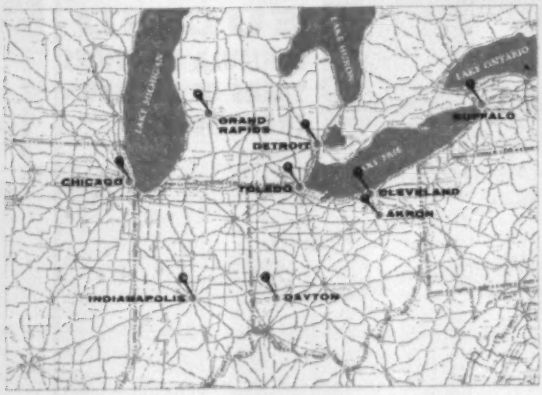

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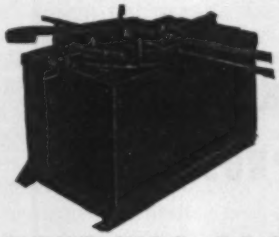
Model D-2



The Model D-2 Kardong Bender is a Four Direction Horizontal Bender. With this bender it is not necessary to turn bars over to make reverse or second bends on beam bars. The Model D-2 is made in two sizes, Model D-2 Standard 6-inch, which will bend bars around collars 2-inch to 6-inch, and Model D-2 Special 8-inch, which will bend bars around collars 2-inch to 8-inch. Capacity of both models, 1¼-inch Square Bars. The Model D-2 is a production bender for reinforcing steel fabricating shop. Ask for catalog of our complete line of reinforcing bar benders.

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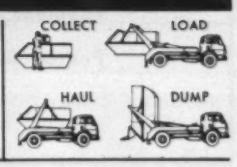

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*SOURCE: Iron Age Basic Marketing Data

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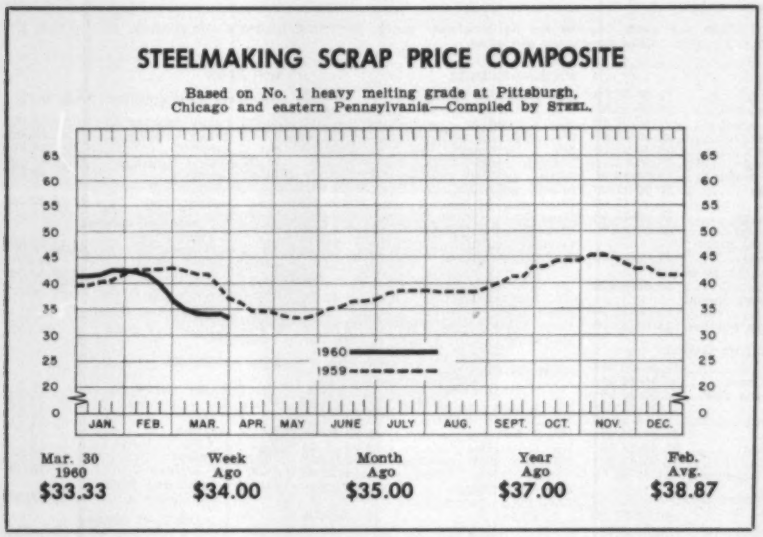


Scrap Price Decline Resumed

STEEL's composite on No. 1 heavy melting grade slips 67 cents a ton to $33.33, after holding steady for one week. Mill buying lags as ingot rate declines

Scrap Prices, Page 198

• **Pittsburgh** — GM's Fisher Body Div. sold 6000 tons of factory bundles to brokers at an average price of $39, about $2.50 a ton less than they brought last month. Leading consumers threatened to cancel any unfilled orders that weren't shipped by Mar. 31, not because they're in dire need of scrap but because they're trying to adjust their inventories to lower production schedules. Railroad specialties (wheels) are in strong demand, reflecting peak operations in foundries that make rolling mill rolls.

• **Chicago**—Except for a few minor ups and downs, the scrap market has stabilized. Opinion is that the bottom has been reached, but consumer purchases are so scattered and involve so little tonnage, that there is no real test of prices.

• **Cleveland**—Industrial No. 1 bundles went at $38.50 on the first April list closed last week. That price represents a drop of about $4 a ton from the previous month's closing and is about $2.50 under the price recently quoted. No. 1 dealer heavy melting continues at $33-$34, though a small sale was made to a local mill at $36. It was not considered representative of the going market because the tonnage was placed with a couple selected yards.

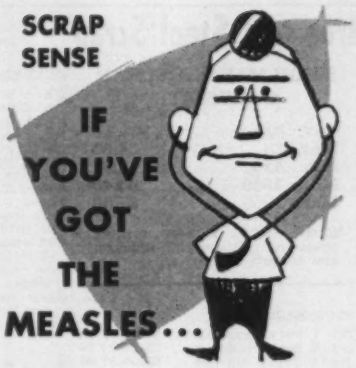
• **Philadelphia**—Domestic demand for steel scrap is dull, and several grades are off $1 a ton. Lack of interest by the mills is thought due to possible overbuying during the strike, substantial production of industrial scrap which the mills take on a reciprocal basis, the likelihood of further easing in steel production, and easier yard collections.

• **Detroit**—The market seems to be hitting bottom as auto lists close. Brokers and dealers anticipate little change in prices although list tonnages are considerably lower. Chrysler's list shows 549 cars of No. 1 items for April shipment vs. 772 for March shipment.

• **New York**—Except for a drop of $5 in the price of 430 sheets, clips, and solids to $75-$80, scrap brokers' buying prices are unchanged. Domestic requirements are light, with only a moderately good export demand sustaining the market on the major steel grades.

(*Please turn to Page* 203)

SCRAP SENSE



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MALLEABRASIVE
MALLEABLIZED SHOT and GRIT

SSP TRU-STEEL SHOT

TRU-STEEL HIGH CARBON STEEL SHOT

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Mar. 30, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Mar. 30	$33.33
Mar. 23	34.00
Feb. Avg.	38.87
Mar. 1959	40.40
Mar. 1955	37.50

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	28.00-29.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	24.00-25.00
No. 1 busheling	34.00-35.00
No. 1 factory bundles	*41.00-42.00*
Machine shop turnings	17.00-18.00
Mixed borings, turnings	17.00-18.00
Short turnings	24.00-25.00
Cast iron borings	24.00-25.00
Cut structurals:	
2 ft and under	*41.00-42.00*
3 ft and under	*40.00-41.00*
Heavy turnings	31.00-32.00
Punchings & plate scrap	46.00-47.00
Electric furnace bundles	*43.00-44.00*

Cast Iron Grades

No. 1 cupola	*43.00-44.00*
Stove plate	46.00-47.00
Unstripped motor blocks	32.00-33.00
Clean auto cast	47.00-48.00
Drop broken machinery	51.00-52.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 2 ft and under	58.00-59.00
Rails, 18 in. and under	59.00-60.00
Random rails	53.00-54.00
Angles, splice bars	47.00-48.00
Railroad specialties	*45.00-46.00*
Rails, rerolling	64.00-65.00

Stainless Steel Scrap

18-8 bundles & solids	220.00-225.00
18-8 turnings	120.00-125.00
430 bundles & solids	120.00-125.00
430 turnings	55.00-65.00

CHICAGO

No. 1 hvy melt., indus.	32.00-33.00
No. 1 hvy melt., dealer	30.00-31.00
No. 2 hvy melting	*28.00-29.00*
No. 1 factory bundles	*36.00-37.00*
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	*20.00-21.00*
No. 1 busheling, indus.	32.00-33.00
No. 1 busheling, dealer	30.00-31.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	38.00-39.00
Punchings & plate scrap	40.00-41.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	42.00-43.00
Unstripped motor blocks	39.00-40.00
Clean auto cast	53.00-54.00
Drop broken machinery	53.00-54.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
R. R. malleable	*52.00-53.00*
Rails, 2 ft and under	52.00-53.00
Rails, 18 in. and under	53.00-54.00
Angles, splice bars	45.00-46.00
Axles	51.00-52.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles, solids	210.00-215.00
18-8 turnings	110.00-115.00
430 bundles & solids	115.00-120.00
430 turnings	55.00-60.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	17.00-18.00
No. 1 bundles	31.00-32.00
No. 2 bundles	15.00-16.00
No. 1 busheling	28.00-29.00
Machine shop turnings	12.00-13.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	10.00-11.00

Cast Iron Grades

No. 1 cupola	40.00-41.00
Stove plate	34.00-35.00
Heavy breakable	34.00-35.00
Unstripped motor blocks	26.00-27.00
Charging box cast	34.00-35.00
Clean auto cast	47.00-48.00

CLEVELAND

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	24.00-25.00
No. 1 factory bundles	*37.50-38.50*
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	33.00-34.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	35.00-36.00
Cut structurals, plate 2 ft and under	43.00-44.00
Low phos. punchings & plate	34.00-35.00
Alloy free, short shovel turnings	17.00-18.00
Electric furnace bundles	34.00-35.00

Cast Iron Grades

No. 1 cupola	49.00-50.00†
Charging box cast	33.00-34.00†
Heavy breakable cast	35.00-36.00†
Stove plate	44.00-45.00†
Unstripped motor blocks	37.00-38.00
Brake shoes	35.00-36.00†
Clean auto cast	52.00-53.00†
Burnt cast	42.00-43.00†
Drop broken machinery	54.00-55.00

Railroad Scrap

R.R. malleable	52.00-53.00
Rails, 2 ft and under	56.00-57.00
Rails, 18 in. and under	57.00-58.00
Rails, random lengths	49.00-50.00
Cast steel	42.00-43.00
No. 1 railroad cast	52.00-53.00
Railroad specialties	45.00-46.00
Angles, splice bars	45.00-46.00
Rails, rerolling	60.00-61.00

Stainless Steel (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	205.00-210.00†
18-8 turnings	105.00-110.00†
430 clips, bundles, solids	110.00-115.00†
430 turnings	35.00-45.00†

YOUNGSTOWN

No. 1 Heavy melting	36.00-37.00
No. 2 heavy melting	27.00-28.00†
No. 1 busheling	36.00-37.00
No. 1 bundles	36.00-37.00
No. 2 bundles	23.00-24.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	37.00-38.00
Electric furnace bundles	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	27.00-28.00
No. 1 bundles	31.00-32.00
No. 2 bundles	23.00-24.00
No. 1 busheling	31.00-32.00
Shovel turnings	21.00-22.00
Machine shop turnings	17.00-18.00
Cast iron borings	19.00-20.00
Low phos. structurals and plate, 2 ft and under	41.00-42.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	45.00-46.00
No. 1 machinery	49.00-50.00

Railroad Scrap

Rails, random lengths	44.00-45.00
Rails, 3 ft and under	50.00-51.00
Railroad specialties	41.00-42.00

CINCINNATI

(Broker's buying prices; f.o.b. shipping point)

No. 1 heavy melting	31.50-32.50
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.50-32.50
No. 2 bundles	21.00-22.00
No. 1 busheling	31.50-32.50
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Shovel turnings	18.00-19.00
Cast iron borings	18.00-19.00
Low phos. 18 in.	44.00-45.00

Cast Iron Grades

No. 1 cupola	43.00-44.00
Heavy breakable cast	37.00-38.00
Charging box cast	39.00-40.00
Drop broken machinery	*53.00-54.00*

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 18 in. and under	55.00-56.00
Rails, random lengths	48.00-49.00

PHILADELPHIA

No. 1 heavy melting	*35.00*
No. 2 heavy melting	*31.00*
No. 1 bundles	37.00
No. 2 bundles	*22.00*
No. 1 busheling	37.00
Electric furnace bundles	38.00
Mixed borings, turnings	*19.00†*
Shovel turnings	23.00†
Machine shop turnings	*19.00†*
Heavy turnings	*29.00†*
Structurals & plates	39.00-40.00
Couplers, springs, wheels	45.00
Rail crops, 2 ft & under	58.00-60.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	*42.00*
Drop broken machinery	51.00-52.00
Malleable	60.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
Machine shop turnings	8.00-9.00†
Mixed borings, turnings	9.00-10.00
Shovel turnings	12.00-13.00†
Low phos. structurals & plates	38.00-39.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	34.00-35.00

Stainless Steel

18-8 sheets, clips, solids	195.00-200.00
18-8 borings, turnings	90.00-95.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	*75.00-80.00*

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	27.00-28.00
No. 1 busheling	27.00-28.00
Machine shop turnings	6.00-7.00
Shovel turnings	11.00-12.00
No. 1 cast	39.00-40.00
Mixed cupola cast	33.00-34.00
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	21.00-22.00
No. 1 busheling	37.00-38.00
Cast iron borings	12.00-13.00
Machine shop turnings	21.00-22.00
Shovel turnings	22.00-23.00
Bar crops and plate	41.00-42.00
Structurals & plate	40.00-41.00
Electric furnace bundles	37.00-38.00
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	*48.00-49.00*
Stove plate	*48.00-49.00*
Charging box cast	29.00-30.00
Unstripped motor blocks	38.00-39.00
No. 1 wheels	38.00-39.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	50.00-51.00
Rails, rerolling	51.00-52.00
Rails, random lengths	45.00-46.00
Angles, splice bars	42.00-43.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	34.00
No. 2 heavy melting	32.00
No. 1 bundles	36.00
No. 2 bundles	22.00
No. 1 busheling	36.00
Machine shop turnings	15.50
Shovel turnings	*18.00*

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	41.00†
Heavy breakable cast	41.00†
Unstripped motor blocks	41.00†
Clean auto cast	51.00
Stove plate	42.00

Railroad Scrap

No. 1 R.R. heavy melt.	38.00
Rails, 18 in. and under	50.00†
Rails, random lengths	45.00
Rails, rerolling	56.00†
Angles, splice bars	45.00†

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	34.00
No. 2 heavy melting	31.00
No. 2 bundles	19.00
Machine shop turnings	*13.00-13.50*
Shovel turnings	*17.00*
Low phos. plate & structurals	*38.00-39.00*

Cast Iron Grades

No. 1 cupola	*38.50-39.00*
Heavy breakable	29.00†
Foundry malleable	*35.50-36.00*
Unstripped motor blocks	*32.50-33.50*

Railroad Scrap

No. 1 R.R. heavy melt.	34.00†

LOS ANGELES

No. 1 heavy melting	*35.00*
No. 2 heavy melting	*32.00*
No. 1 bundles	*31.00*
No. 2 bundles	*16.00*
Machine shop turnings	16.00
Shovel turnings	*16.00*
Cast iron borings	*16.00*
Cut structurals and plate 1 ft and under	*46.00-47.00*

Cast Iron Grades

No. 1 cupola	*44.00*

Railroad Scrap

No. 1 R.R. heavy melt.	39.00

PORTLAND, OREG.

No. 1 heavy melting	*33.00*
No. 2 heavy melting	*29.00*
No. 1 bundles	*29.00*
No. 2 bundles	*24.00*
Shovel turnings	*16.00*
Electric furnace bundles	*43.00*

Cast Iron Grades

No. 1 cupola	*31.00*
Heavy breakable	*26.00*
Unstripped motor blocks	*24.00*
Stove plate	*21.00*

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	*32.00*
No. 2 heavy melting	*28.00*
No. 1 bundles	*28.00*
No. 2 bundles	*23.00*
Machine shop turnings	*15.00*
Mixed borings, turnings	*15.00*
Electric furnace No. 1	*42.00*

Cast Iron Grades

No. 1 cupola	*30.00*
Heavy breakable cast	*25.00*
Unstripped motor blocks	*23.00*
Stove plate (f.o.b. plant)	*20.00*

SAN FRANCISCO

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00
No. 1 bundles	31.00
No. 2 bundles	20.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices)

No. 1 heavy melting	32.25
No. 2 heavy melting	28.25
No. 1 bundles	32.25
No. 2 bundles	24.00
Mixed steel scrap	24.25
Mixed borings, turnings	13.00
Busheling, new factory:	
Prepared	32.25
Unprepared	26.25
Shovel turnings	17.00

Cast Iron Grades‡

No. 1 machinery cast	46.50-48.00

†Nominal.
‡F.o.b. Hamilton, Ont.

the question is time

During the past few years, the cancer cure rate has increased from one in four saved to one in three saved: 40,000 more lives saved each year. During the next few years, there will no doubt be new methods of diagnosis, and even cures for some cancers that are considered incurable today. In time, the ultimate goal, cancer prevention, will be achieved. But time alone will not do the job. ● Time plus research will. Research costs money. In the past 14 years, the American Cancer Society has spent about $76,500,000 on cancer research. Much more is needed to accomplish the final conquest of this dread disease. Give generously. Send your contribution to "Cancer," in care of your local post office.

AMERICAN CANCER SOCIETY

the answer is money

guard your family...fight cancer with a checkup and a check

Mercury 'Back to Normal'

The market appears to have weathered the shock left when government supports ended. Outlook: Prices to hover near present levels, plentiful supply, little change in demand

Nonferrous Metal Prices, Pages 202 & 203

AFTER a year of hectic readjustment in 1959, the mercury market appears to have settled down to a steady, if not altogether satisfactory, pace.

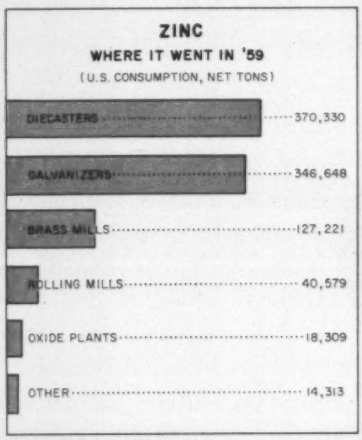
• **Supports End**—Most metals recovered last year, but 1959 saw the mercury price plummet from a high of $245 a flask (of 75 lb) to a low of $212 at yearend. Chief cause: Termination of the U. S. government price support program which had buoyed up both the U. S. producers and prices since 1954. Under the program, the government bought metal for stockpile for $225 a flask. That, of course, stimulated production and higher prices.

Domestic mine production followed the course of falling prices last year, dropping off 19 per cent to 30,750 flasks. It was the first time output failed to go up since 1950. It's unlikely production will gain any this year.

Imports are another story. Shipments from Italy, Spain, and Mexico (Italy and Spain produce 48 per cent of the Free World's requirements) totaled 30,260 flasks, virtually the same as in 1958, and accounted for about 50 per cent of U. S. supply. Foreign producers are expected to take as much of the U. S. market this year as last since we've traditionally relied on imported metal to fill a large part of our needs. Too, even with a $19.25 per flask duty on imports, foreign producers can undersell domestic companies. So it was logical that output of domestic mines should be trimmed when the government program ended.

• **Demand Fair**—Domestic consumption showed a slight gain in 1959 to 53,100 flasks, reversing three years of modest backsliding.

Sales got off to a slow start in 1960 and the first quarter can be termed only "fair," particularly in comparison with last year's fourth quarter which ended strongly. Sales should begin to move up soon, say marketmen. They generally believe the outlook for the rest of the year is good.



Source: U.S. Bureau of Mines.

• **The Future**—At the heart of U. S. producer troubles are the basic geological and economic facts that "American mercury deposits are still small, irregular and scattered, plus being generally poorer than those in some foreign countries, and having higher production costs in comparison," says the Justice Department.

Mercury demand has been static in recent years and there's no reason to believe any significant change will take place in the foreseeable future. Major applications are (in order of importance): Electrical apparatus; agriculture; industrial and control instruments; electrolytic preparation of chlorine and caustic soda; pharmaceuticals; and dental preparations.

• **Prices Stable**—Prices should hold close to the present $213 to $215 a flask for at least the next few months and probably throughout the year. Supply is adequate and no heavy demand is anticipated. Foreign producers are unlikely to dump any large supplies on this market for fear of weakening the price further.

In the Markets

• **Still Chaos in Cuba**—Fate of U. S. nickel operations in Cuba remains unsettled. The U. S. government owned complex at Nicaro is still operating, but no shipments are being made to the U. S. At the other end of the island, Freeport Sulphur Co.'s Moa Bay Works is closed. Cuban officials reportedly have offered some suggestions towards reopening the facility.

• **Zinc Premiums Up**—As of Apr. 1, the premiums on high grade and special high grade zinc are 0.25 per cent a pound more. That means you'll be paying 14.50 cents for high grade and 14.75 cents for special high grade.

NONFERROUS PRICE RECORD

	Mar. 30 Price	Last Change	Previous Price	Feb. Avg	Jan. Avg	Mar., 1959 Avg
Aluminum	26.00	Dec. 17, 1959	24.70	26.000	26.000	24.700
Copper	33.00	Mar. 10, 1960	33.00–35.00	34.000	34.000	32.031
Lead	11.80	Dec. 21, 1959	12.30	11.800	11.800	11.238
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	74.000
Tin	99.875	Mar. 30, 1960	99.75	101.170	99.875	103.000
Zinc	13.00	Jan. 8, 1960	12.50	13.000	12.917	11.000

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig, 99.8%, Velasco, Tex.

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- superior surface grinding

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Write for bulletin ESA 188

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.60; No. 43, 25.90; No. 195, 30.70; No. 214, 31.50; No. 356, 26.30. 30 lb ingots; 10 lb ingots, add 0.4 cent per lb; 6 lb ingots, add 0.6 cent per lb.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.00-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.50 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg, $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $75-80 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 50 lb, $11 per lb f.o.b. Minneapolis; 50-99 lb, $10; 100-499 lb, $9.50; 500 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $213-215 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.00 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 99.875.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.50-4.25.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb., New York basis, add 0.50. High grade, 14.50; special high grade, 14.75 deld. Diecasting alloy ingot No. 3, 16.50; No. 2, 17.00; No. 5, 16.75 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 27.25-29.00; No. 12 foundry alloy (No. 2 grade), 25.00-25.25; 5% silicon alloy, 0.60 Cu max., 25.50-25.75; 13 alloy, 0.60 Cu max., 25.50-26.00; 195 alloy, 27.75-28.75; 108 alloy, 25.25-25.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.50; grade 2, 24.25; grade 3, 23.25; grade 4, 22.75.

Brass Ingot: Red brass, No. 115, 30.75; tin bronze, No. 225, 41.50; No. 245, 36.00; high-leaded tin bronze, No. 305, 35.25; No. 1 yellow, No. 405, 24.75; manganese bronze, No. 421, 29.25.

Magnesium Alloy Ingot: A63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $4.00-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base, f.o.b. customer custody.

Thickness Range (in.)	Widths (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.10-47.70
0.136-0.096	24-72	72-180	45.50-48.70
0.096-0.077	24-72	72-180	46.20-50.00
0.077-0.068	24-72	72-180	46.70-51.70
0.068-0.061	24-72	72-180	46.70-55.50
0.061-0.048	24-72	72-180	47.30-57.30
0.048-0.038	24-72	72-180	47.80-60.20
0.038-0.030	24-72	72-180	48.20-65.30
0.030-0.024	24-60	72-180	48.70-56.60
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-36	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	44.60	49.40
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base, 12 ft lengths.

Diam. (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	72.90	75.80	....	....
0.188	....	....	....	78.20
0.250	58.00	61.60	70.70	72.30
0.375	57.20	62.40	69.00	70.50
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	57.20	62.40	69.00	70.50
0.625	57.20	62.40	65.80	66.60
0.750	55.70	60.70	59.60	62.60
0.875	55.70	60.70	59.60	62.60
1.000	55.70	60.70	59.60	62.60
1.125	53.30	58.30	57.50	60.40
1.250	53.30	58.30	57.50	60.40
1.375	53.30	58.30	57.50	60.40
1.500	53.30	58.30	57.50	60.40
1.625	51.00	55.60	....	58.20
1.750	51.00	55.60	56.30	58.20
1.875	51.00	55.60	....	58.20
2.000	51.00	55.60	56.30	58.20
2.250	49.50	54.00	....	58.20
2.500	49.50	54.00	....	58.20
2.750	47.90	52.20	....	58.20
3.000	47.90	52.20	....	58.20
3.250	....	52.20	....	....
3.375	....	52.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.20-56.90; 6061, 43.20-56.90; 7075, 61.50-71.20; 7079, 66.50-76.20.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 31.55; 1¼ in., 42.75; 1½ in., 51.05; 2 in., 61.70; 3 in., 123.40; 4 in., 169.55; 5 in., 229.60; 6 in., 304.60; 8 in., 458.40; 10 in., 706.45 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	44.70-46.20	53.20-59.00
15-17	44.70-46.20	55.60-60.80
18-23	45.20-46.80	57.70-66.40
24-32	45.20-46.80	65.60-78.80
33-38	48.80-51.40	82.30-93.40
39-44	58.70-62.40	99.90-121.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.10; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	94.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.25-23.50; No. 2 heavy copper and wire, 20.50-20.75; light copper, 18.00-18.25; No. 1 composition red brass, 16.00-16.50; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 33.00c)		
	Sheets, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	57.13b	54.86c	....	58.32	29.000	29.000	28.250
Yellow Brass	50.57	36.06d	50.86	54.23	22.250	21.250	20.250
Low Brass, 80%	53.53	53.22	53.82	57.09	24.750	24.500	24.000
Red Brass, 85%	54.58	54.27	54.87	58.14	25.750	25.500	25.000
Com. Bronze, 90%	56.17	55.86	56.46	59.48	26.750	26.500	26.000
Manganese Bronze	58.86	52.21	62.69	....	20.875	26.625	19.875
Muntz Metal	53.20	48.26	....	....	20.875	20.625	20.125
Naval Brass	55.12	48.68	61.43	58.78	20.750	20.500	20.000
Silicon Bronze	62.86	61.80	62.15	80.79	28.375	28.125	27.375
Nickel Silver, 10%	65.98	68.06	68.06	....	26.875	26.625	14.937
Phos. Bronze	77.44	78.19	77.69	79.37	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.00-15.50; new brass clippings, 14.50-15.00; light brass, 10.50-11.00; heavy yellow brass, 11.50-12.00; new brass rod ends, 12.00-12.25; auto radiators, unsweated, 12.50-13.00; cocks and faucets, 13.00-13.50; brass pipe, 13.00-13.50.

Lead: Soft scrap lead, 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.00-9.50.

Monel: Clippings, 27.00-28.00; old sheets, 23.00-24.00; turnings, 20.00-22.00; rods, 27.00-28.00.

Nickel: Sheets and clips, 53.00-54.00; rolled anodes, 53.00-54.00; turnings, 41.00-42.00; rod ends, 53.00-54.00.

Zinc: Old zinc, 4.00-4.50; new diecast scrap, 4.00-4.50; old diecast scrap, 2.25-2.75.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 15.00-15.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 12.50-13.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 16.50-17.00; segregated high copper clips, 15.50-16.00; mixed low copper clips, 15.50-16.00; mixed high copper clips, 15.00-15.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.75-12.00; clean borings and turnings, 10.50-11.00; segregated low copper clips, 15.50-16.00; segregated high copper clips, 14.50-15.00; mixed low copper clips, 15.00-15.50; mixed high copper clips, 14.00-14.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.
Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.25; light copper, 22.00; refinery brass (60% copper) dry copper content, 21.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.25; light copper, 22.00; No. 1 composition borings, 20.50; No. 1 composition solids, 21.00; heavy yellow brass solids, 15.25; yellow brass turnings, 14.00; radiators, 16.25.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.
Copper: Flat-rolled, 50.04; oval, 48.00; 5000-10,000 lb; electrodeposited, 42.00; 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.
Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.
Tin: Bar or slab, less than 200 lb, 118.50; 200-499 lb, 117.00; 500-999 lb, 116.50; 1000 lb or more, 116.00.
Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.40 per lb in 100-lb drums.
Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.
Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,900 lb, 61.90.
Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.
Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.
Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.
Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.
Sodium Stannate: Less than 100 lb, 78.50; 100-600 lb, 69.20; 700-1900 lb, 66.40; 2000-9900 lb, 64.60; 10,000 lb or more, 63.30.
Stannous Chloride (Anhydrous): 25 lb, 153.80; 100 lb, 148.90; 400 lb, 146.50; 800-19,900 lb, 105.60; 20,000 lb or more, 99.50.
Stannous Sulphate: Less than 50 lb, 139.00; 50 lb, 109.00; 100-1900 lb, 107.00; 2000 lb or more, 105.00.
Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 197)

- **Buffalo**—Prices are holding, pending a buying test. Expectations are April sales will be at recent levels.

- **St. Louis**—Districts like Chicago seem to have firmed up. Such developments have eased the downward price trend. The next week or two probably will show some change.

- **Cincinnati**—The market is quiet and prices are little changed. Drop broken machinery is off $1 a ton to $53-$54. A slight hint of strength is reported developing with district mills expected to enter the market when the industrial lists come out.

- **Los Angeles** — The market appears a little firmer at the moment, but some talk is heard of lower prices this month.

- **San Francisco**—Little tonnage is moving and dealers anticipate a further price decline. Some say a reduction of $1 to $2 a ton is likely unless demand spurts soon.

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(3) E16 Solid Half Couplings

#14 FARREL-BIRMINGHAM
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(1) Floating Shaft Consisting Of: 2—#14 Flex. Half Couplings and 1 Shaft 14" Dia. x 7' 6⅝" Lg.
(5) Floating Shafts Each Consisting Of: 2—#14 Solid Half Couplings and 1 Shaft 14" Dia. x 8' 7¼" Lg.
(5) #14 Flex. Half Couplings
(6) #14 Shells
(6) #14 Hubs
(6) #14 End Covers
(6) #14 Solid Half Couplings

#12 FARREL-BIRMINGHAM
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(1) #12 Shell
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(1) #12 End Cover
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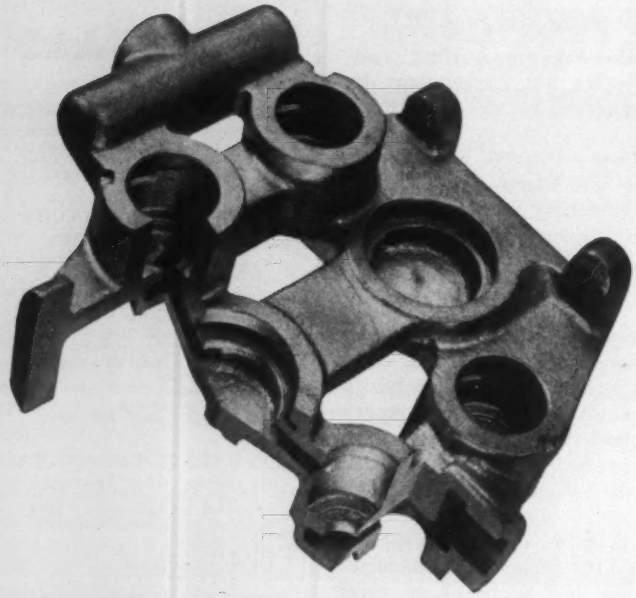

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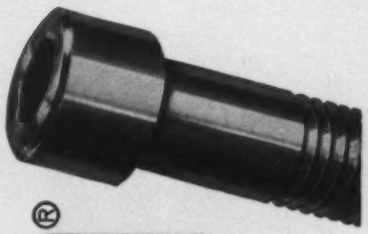

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1835 Reading Road Cincinnati 2, Ohio

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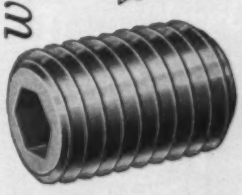

To the Executive caught between Cost and Competition . . .

Do you know how much can be saved by using Clad-Rex® vinyl-clad metals?

Here's why you should find out! Products can be fabricated of Clad-Rex with fewer operations than unfinished metals need. What's more . . . the added styling gives them much more sales appeal.

Clad-Rex vinyl-clad metals are "finished" when you get them. Therefore, the extensive metal treating and finishing needed for bare metal is not necessary. Further, the unusual abrasion resistance of Clad-Rex makes delicate handling unnecessary. This sharply reduces rejects, as well as expensive stripping and rework operations.

Clad-Rex vinyl-clad metals can be formed, drawn or worked much the same as bare metals! No special tooling or involved technique is required. Think of the savings you might get handling your raw material from the forming dies directly into assembly!

Incidentally, even though Clad-Rex is prefinished, you're not restricted to the usual limited choice of styling — color, texture and print in Clad-Rex vinyl-clad metals are almost unlimited.

High dielectric strength, corrosion resistance, workability, etc. . . . there's enough advantage that you should get the facts. See for yourself why Clad-Rex, which costs more than *un*finished metals, can make your end product cost less. Write today. No obligation, of course.

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11A

Only TURBO-CUT by Threadwell has a full 3-4 thread plug chamfer!

Benefit? Turbo-Cut's longer chamfer distributes the load over more teeth and breaks up chips to minimize tap breakage. Turbo-Cut's longer chamfer makes tapping easier and cleaner on through holes, does a one-pass job on blind holes. Only Threadwell makes the genuine Turbo-Cut with the longer chamfer.
Also available in bottoming chamfer.

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MAKES THE BEST PRODUCT BETTER

INDUSTRIAL DISTRIBUTION
THE RIGHT HAND OF PRODUCTION

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Stocking Warehouses: New York — Cleveland
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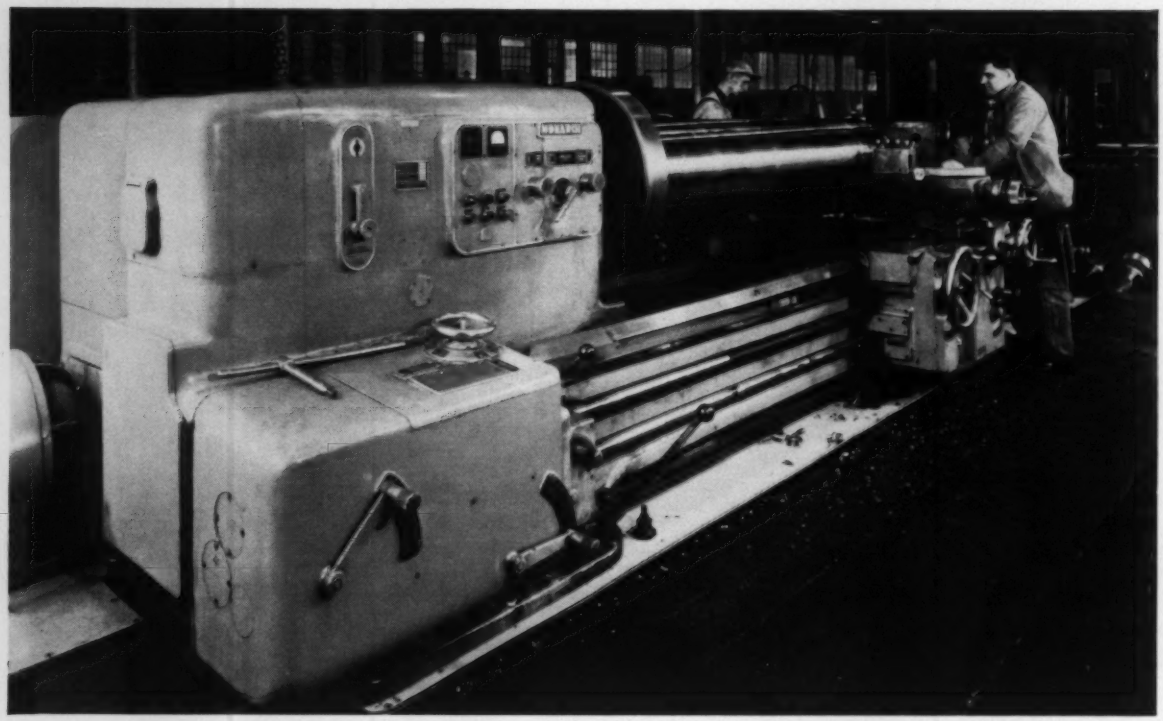
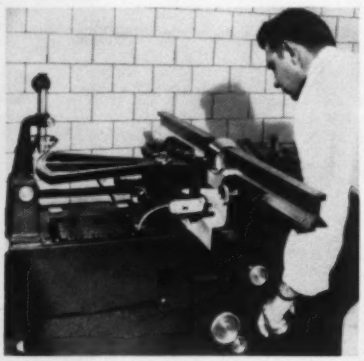
"Dyna-Shift" lathe ups output 25%, tool life 50%, —30 Timken® bearings maintain rigidity, accuracy



YOU merely set the controls of the Dyna-Shift drive on this Monarch Series 90 lathe to get the correct speed automatically. What's more, the "90" can be kept under full load at any speed, using modern tooling. Results, reports Monarch, show up to 25% more output and 50% greater tool life than with other equipment. Thirty Timken® tapered roller bearings at vital points—spindle, gear box, apron and tailstock—assure constant rigidity and accuracy, for maximum economy.

Most American machine tool builders use Timken bearings. Two big reasons are: 1) The taper lets Timken bearings take *both* radial and thrust loads or any combination. 2) Precision manufacture of Timken bearings assures high precision in the machine.

EXTRA ENGINEERING SERVICE. Often, our graduate engineer salesmen can solve your bearing problems on the spot, at the design stage, save you time and money.



THE FINEST GAGE LAB in the industry assures you top bearing accuracy. Some instruments we use measure even the thickness of a molecule, split a hair 30,000 times.

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